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Car Repair Line for L&N

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RAILWAY
LOCOMOTIVES AND CARS
DECEMBER 1960

COMP
EDITORIAL DEPT
UNIV MICROFILMS INC
313 N FIRST ST
ANN ARBOR MICH

FOUNDED
1832
AMERICA'S
OLDEST
TRADE PAPER

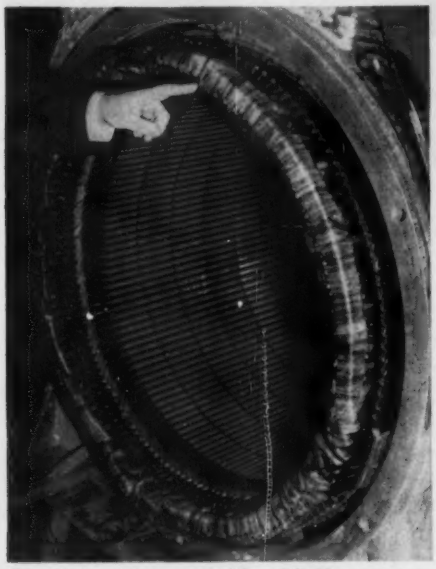
Pennsylvania 4,400-hp Rectifier Electrics in Service . . . page 50

Merry
Christmas
W. H. MINER, INC. CHICAGO

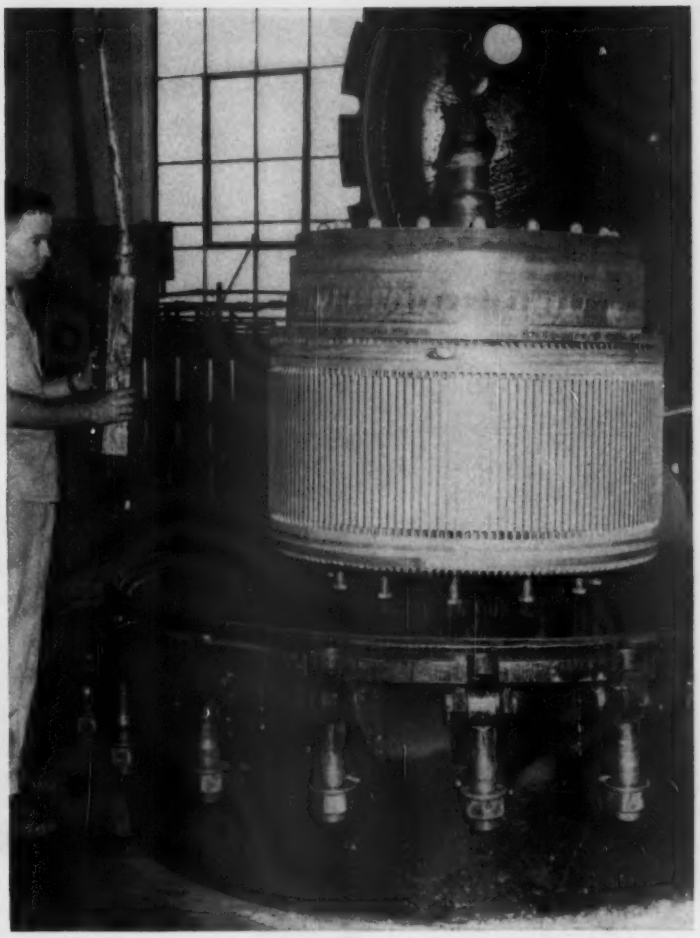
For maximum motor life...

NATIONAL VACUUM-IMPREGNATES THE COMPLETE MOTOR WITH EPOXY

National offers superb facilities for rewinding and rebuilding rotating electrical machines...such as this large vacuum tank used in impregnating insulations with super-strong Epoxy resins. Not only single coils, but complete armatures and stators from large motors and generators are regularly handled in this equipment.



Complete stator assembly with NECCOBOND insulation system, after vacuum impregnation with Epoxy resins.



Diesel electric generator armature is lowered into huge vacuum pressure tank.

This process, used with the NECCOBOND insulation system provides these assurances of maximum service life:

- the insulation wall is completely void-free, with all interstices filled with resin to provide maximum heat conductivity.
- the exceptional mechanical strength and adhesion of Epoxy resin bonds the entire winding and core into a solid mass.
- uniform encapsulation provided by National's method of baking, insures high degree of protection against moisture.

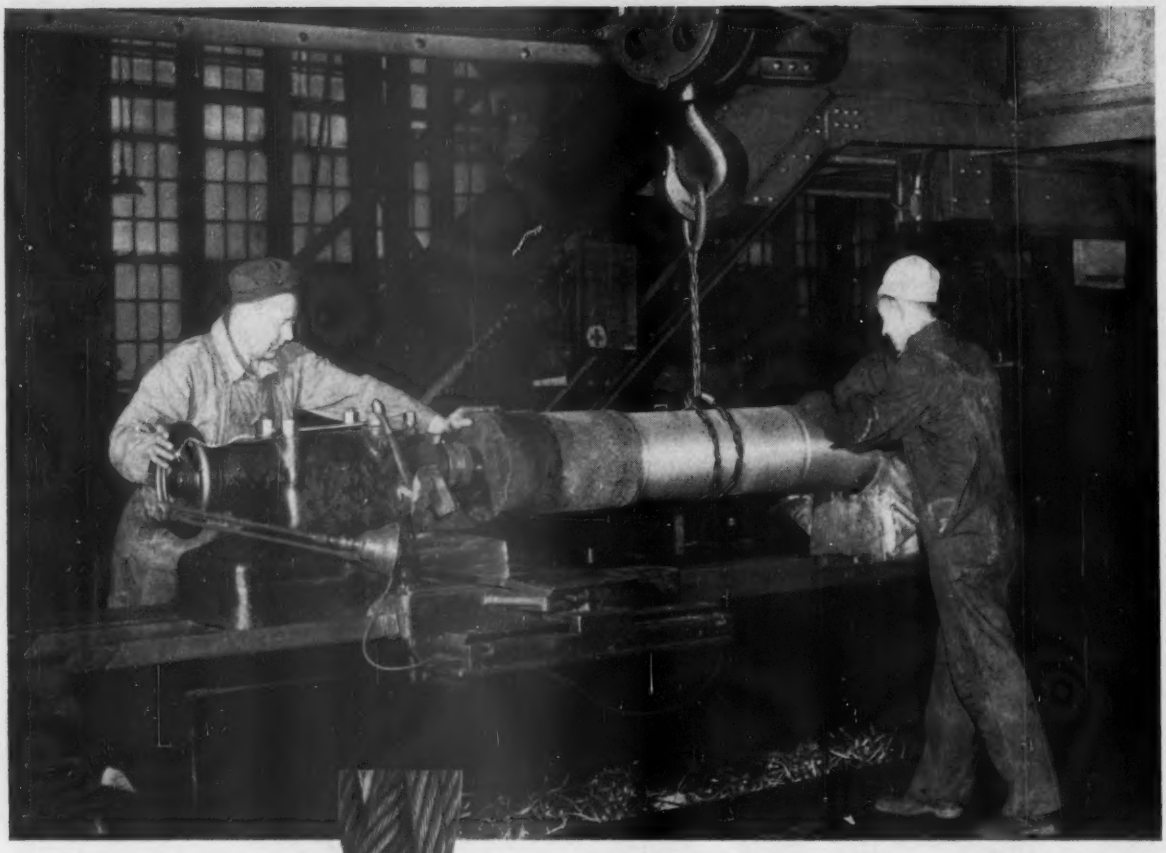
Whether your electric coil and rebuilding needs are standard or special, you'll be sure of performance when you call in National Electric Coil. We tailor-make the coils to fit your needs, offer all types of insulation. For information call National's Columbus plant ...HUdson 8-1151...or check the nearest National field engineer.

NATIONAL COILS

National Electric Coil

COLUMBUS 16, OHIO • IN CANADA: ST. JOHNS, QUEBEC

DIVISION OF McGRAW EDISON



Special Draw-Bar Sling recommended for handling cars by coupler shank.

Braided Safety Sling with Patented Twin Thimble.

Diesel Car Wheel Sling with legs of unequal length to balance load.

Yellow Strand Braided Safety Slings are available in practically any length and number of parts, with scores of different fittings.

Handle any size, shape, weight of lift with maximum safety and ease

Machined parts, any size, weight or shape – massive forgings and assemblies weighing hundreds of tons: practically anything you have to lift on the railroad can be handled better and safer with Broderick & Bascom Braided Safety Slings! We can supply you with an unlimited variety of specialized wire rope slings, each one capable of doing its job better than any other type of sling.

These are extremely flexible slings with the strength of Yellow Strand, flexibility comparable to manila rope. For special requirements, they are available with high strength "POWERSTEEL."

Most important, Yellow Strand Braided Safety Slings are designed for your specific application by B & B sling specialists and built by skilled master craftsmen.

For that extra margin of confidence on all your lifting jobs, call our nearest branch, or our Engineering Department. *Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Mo.*

Yellow Strand®

BRAIDED SAFETY SLINGS

RAILWAY
LOCOMOTIVES
AND
CARS

America's Oldest Trade Paper
December 1960—Vol. 134, No. 12

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REPORT FOR DECEMBER

Meetings Cancelled by AAR Economy Measures

The AAR Electrical Section of the Engineering and Mechanical Divisions is to cease functioning as a separate unit at the end of 1960, and the Mechanical Division will not meet during 1961. Both of these actions are being taken following a request by AAR President D. P. Loomis that all divisions and sections take steps to cut expenses.

Action cancelling the annual meeting of the Mechanical Division was taken during a recent meeting of the division's General Committee in New York. The 1961 meeting had been scheduled for Chicago in June. It is now expected that the division's next session will be held in 1962.

Electrical Section work pertaining to locomotives and rolling stock is to be absorbed by appropriate groups within the Mechanical Division. Similar steps will be taken by the Engineering Division and its allied American Railway Engineering Association. It is not anticipated that there will be any expansion in the number of committees in the Mechanical Division. That group had recently completed a consolidation which reduced the number of committees from 18 to 13 (RL&C, August 1960, p 10). There have been 18 committees in the Electrical Section.

The effect of these two AAR actions on other organizations which are concerned with the design and maintenance of locomotives and rolling stock has caused considerable speculation. R. L. Wilson, 1960 chairman of the Railroad Division, American Society of Mechanical Engineers, has recently reported that the plans being made by the ASME and the American Institute of Electrical Engineers for a Railroad Conference next April have not been changed. These two organizations will meet at the Sir Francis Drake Hotel in San Francisco, Cal., on April 20 and 21.

The regular session of the Land Transportation Committee of the AIEE will be held as part of the AIEE annual meeting at the Statler Hotel in New York on February 1 and 2.

The September 1961 convention of the Coordinated Mechanical Associations—Air Brake, Car Department Officers, Locomotive Maintenance Officers' and Railway Fuel and Operating Officers—will be held at the Hotel Sherman, Chicago, on September 11, 12 and 13, 1961.

TOFC Interchange Code Is Effective January 1

Interchange rules covering trailers and containers moving in piggyback service have been adopted by the AAR Mechanical Division. The new code, to be effective January 1, 1961, was adopted by "an overwhelming majority," according to an AAR spokesman. The ballot closed on November 3. The format of the code is similar to that of the present one covering freight cars. Currently, loading rules for open-top and closed trailers are being prepared.

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TIME SAVING IDEAS FOR DECEMBER

MOTIVE POWER AND CAR

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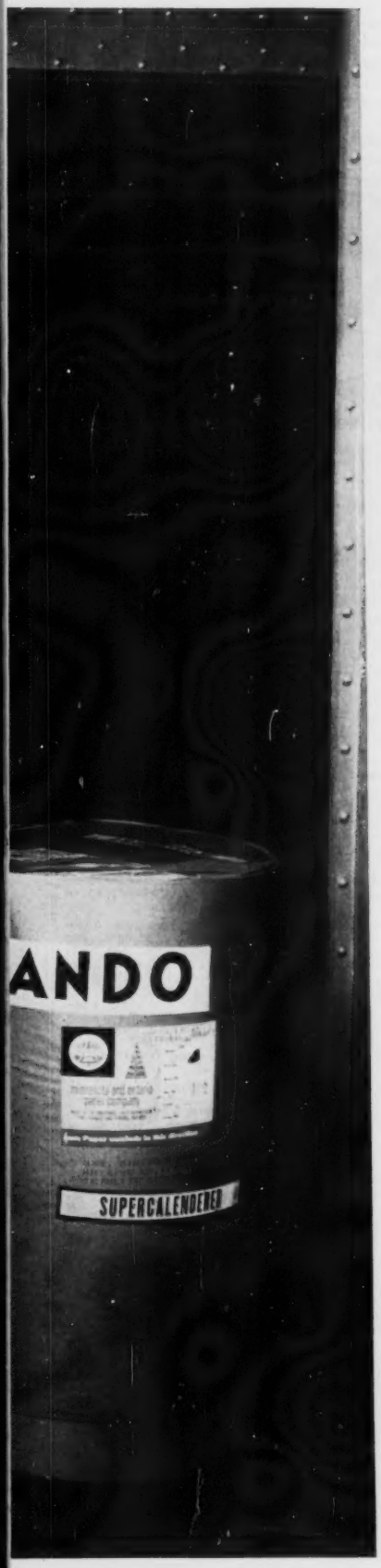
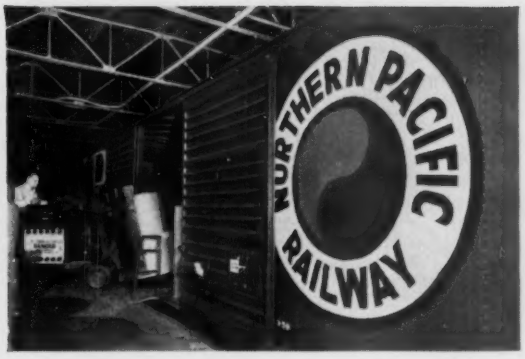
MAN
SUPERCALENDERED





SHIPPERS WELCOME CARS WITH N-S-F® FOR SWIFT, SAFE LOADING OF EVEN THE HEAVIEST FREIGHT

"When a car equipped with N-S-F comes into one of our plants, I don't have to worry about the condition of the floor—I know it's Class A."

So says F. E. Hufford, General Traffic Manager for Minnesota and Ontario Paper Company. A satisfied shipper, thanks to Northern Pacific service, he knows that NAILABLE STEEL FLOORING, welded to the underframe of a freight car, actually adds strength at critical points and takes another big load off the shipper's mind.

Seventy-five progressive railroads have equipped a total of more than 75,000 cars with N-S-F products. Everybody benefits. Shippers welcome the safety, speed, and security and ease of blocking. Railroads like the lading versatility, reduced damage claims and long life without rip-tracking.

The three Stran-Steel products to remember are N-S-F for flooring, Anchor Lining for sidewalls and endwalls, and Stran-Steel Grain Door Nailers, that take repeated nailing of grain doors without weakening. Full information and cost studies are available from Stran-Steel representatives in Chicago, New York, Philadelphia, St. Louis, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal. Stran-Steel Corporation, Detroit 29, Michigan.

Stran-Steel® N-S-F

STRAN-STEEL IS A DIVISION OF **NATIONAL STEEL CORPORATION**

(Continued from page 5)

The new code will make trailer owners responsible for repairs necessitated by ordinary wear and tear and by regulations of the AAR and regulatory agencies. It also places responsibility and gives a means for settlement of trailer damage resulting from improper handling or improper protection by the handling company; it establishes an equitable basis for charging repairs and damage, and establishes a standard inspection for trailers offered in interchange.

Trailer offered for movement shall be accepted if it conforms to the following:

- It carries name or initial of owner or lessee and number;
- Explosives or other dangerous articles are properly placarded;
- Lading is properly distributed, secured and blocked;
- It conforms to published railroad clearances and, subsequently, to published highway clearances;
- Its weight conforms to all regulations governing the various transportation services to final destination;
- It is equipped with conventional seven-conductor electrical connector, properly wired and installed, and with voltage marked adjacent to socket;
- It is equipped with properly operating flashing turn signals;
- It is equipped with operating stop lights, tail lights, clearance and marker lights, and other accessories required by regulatory agencies;
- It is equipped with mud flaps;
- There is a waterproof container for necessary papers attached to exterior on nose end;
- Tires conform to requirements of code;
- Landing gear conforms to requirements of Code.

The Code then specifies the requirements for tires, landing gears, refrigeration and heating equipment, and special accessories. These special accessories generally are the items which may be removed from the trailer and include: chains, binders and cables; tarpaulins, including securements; tarpaulin bows; spreader bars or tie rods; bulkhead and bulkhead boards; sides, gates, section, or floor racks; mounted spare tire; auto transport equipment, such as skids, retainer pins, stands, tie-down chains, cables and hooks, and meat hooks. The delivering carrier is responsible for any of these removable items listed on Trailer Interchange and Safety Inspection Form which are missing when trailer is offered in interchange.

Proper replacement and securement on trailer of tarpaulins, tarpaulin bows, spreader bars, side sections, end gates, etc., which were removed to facilitate loading or unloading is the responsibility of the carrier in possession of trailer.

The using carrier will be responsible for "ordinary maintenance" at no charge to trailer owner. This includes inspection, servicing, and lubrication by the using carrier in accordance with its maintenance program; the tightening or adjusting of trailer tie downs and attachments; the tightening of air or vacuum hose couplings or piping and replacement of gaskets, and cleaning interiors.

When repairs are made to a trailer regardless of responsibility, a record must be furnished owner. Repairs amounting to $10 or less need not be reported to owner and will be assumed by carrier making such repairs. When estimated cost of repairs exceeds $50, exclusive of tires, the authority of trailer owner must be obtained before proceeding with the repairs, regardless of responsibility. After 48 hr from time of notification, per diem ceases until repairs are authorized or disposition is furnished by owner. When a trailer damaged in excess of $50 is returned to owner at his request for repairs, the carrier responsible for damage must be furnished a list of repairs to be made and the estimated cost before repairs are begun and same shall be subject to acceptance of responsible carrier.

Forms to be used in conjunction with these new interchange rules include the following:

- Trailer Billing Repair Form;

(Continued on page 64)

The Canadian National diesel locomotive shop at Moncton (N.B.) Yard (above) is one of five major running repair facilities completed, or under way, across Canada which are laid out around central work and stores areas. All are similar to the shop at Montreal (RL&C, April 1960, p. 23). The Moncton shop has facilities for handling all types of running repairs, but major overhauls will continue to be done at the main Moncton shops. Each of its 16 repair tracks—eight at each end—can accommodate two diesel units, while two additional tracks running the length of the building are fitted with drop tables, making possible rapid wheel changes. All repair tracks are elevated to ease inspection of running gear. Two other floors permit similar cab and roof level inspections.

Orders and Inquiries for New Equipment

Placed Since Closing of Nov. Issue

Freight-Car Orders

CANADIAN NATIONAL. *Canadian Car:* 300 insulated box cars with underslung, thermostatically controlled methanol heaters. Delivered in November. *Eastern Car Div., Dominion Steel & Coal:* 25 42-ft, 40-ton narrow-gage flat cars for use on Newfoundland lines.

CENTRAL OF GEORGIA. *Company shops.* 328 50-ton, 40½-ft box cars, using components reclaimed from retired equipment. Estimated cost, $1,615,000.

CHESAPEAKE & OHIO. *Company shops.* 350 70-ton, 50½-ft merchandise box cars equipped with special loading equipment. Cost, $4.8 million.

GREAT NORTHERN. *Company shops.* 500 50-ft roller-bearing equipped box cars with 6-ft slide and 8-ft plug doors. Part of 1961 equipment program. See also Notes and Inquiries.

LOUISVILLE & NASHVILLE. *Pullman-Standard:* 900 gondolas; 900 hopper cars. For 1961 delivery. Cost, $19,000,000.

NEW YORK CENTRAL. *North American Integrated Flatcar Transport, Inc.* 216 multi-level cars. To carry automobiles on open racks divided into double and triple decks. On lease.

NORTH AMERICAN CAR. *Pullman-Standard.* 7 70-ton flats. This order incorrectly credited to General American in November issue.

NORTHERN PACIFIC.—*General American:* 5 70-ton, 3,500-cu ft Dry-Flo covered hopper cars. For delivery this month. *Company shops:* 168 50-ft double-door box cars; 200 50-ft insulated RBL cars with damage-prevention devices, 9-ft plug doors, rubber draft gear, and nailable steel flooring; 150 50-ft double-door box cars with damage-prevention devices (for tin plate service), and 200 40-ft box cars with combination plug and sliding doors. All cars equipped with roller bearings. Part of 1961 equipment program. See also Notes and Inquiries.

PENNSYLVANIA. *Company shops.* 2,500 70-ton hopper cars; 1,000 heavy duty "jennies" for hauling iron ore. To be in service by next September.

Notes and Inquiries

Great Northern's 1961 equipment program includes, in addition to box cars listed above, 50 40-ft box cars with cushion underframes and 9-ft doors; 10 all-steel cabooses; 100 special type, and 100 50-ft mechanical refrigerator cars with load dividers for GN subsidiary, Western Fruit Express. All cars to be roller-bearing equipped. Program includes also the rebuilding of 18 diesel locomotives.

New York City Transit Authority will purchase additional 60 subway cars for BMT line with $7,400,000 allocated in October for that purpose.

Northern Pacific's 1961 $14,500,000 equipment program includes, in addition to cars listed above, purchase of 150 60-ft wood-chip cars; 50 mechanical refrigerator cars; 50 steel cabooses; 20 70-ton covered hopper cars equipped with pneumatic unloading devices; and 50 tri-level and 13 bi-level racks for automobile transport. All cars to be equipped with roller bearings.

Pullman-Standard; Kurth Malting Co., A pneumatic end-unlading covered hopper car developed jointly by these companies for bulk material handling being tested by Kurth. Unloading tubes 6 in. in diameter run from end to end of car, connecting hopper outlets longitudinally on each side. Equipment to be offered on all standard PS-2 cars with capacities up to 3,500 cu ft.

Too much brush breakage?

These switchers were death on brushes ...'til the road tried NATIONAL TRADE MARK

M. HENIKA

PROBLEM: Road switching locomotives broke hundreds of brushes per month because of severe vibration.

RECOMMENDATION: "National" Brush Grade DE-3.

RESULTS: Not one report of brush breakage in the following twelve months.

Contact your "National" Brush Man

"National", "N" and Shield Device, and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY
Division of Union Carbide Corporation • 270 Park Avenue, New York 17, New York
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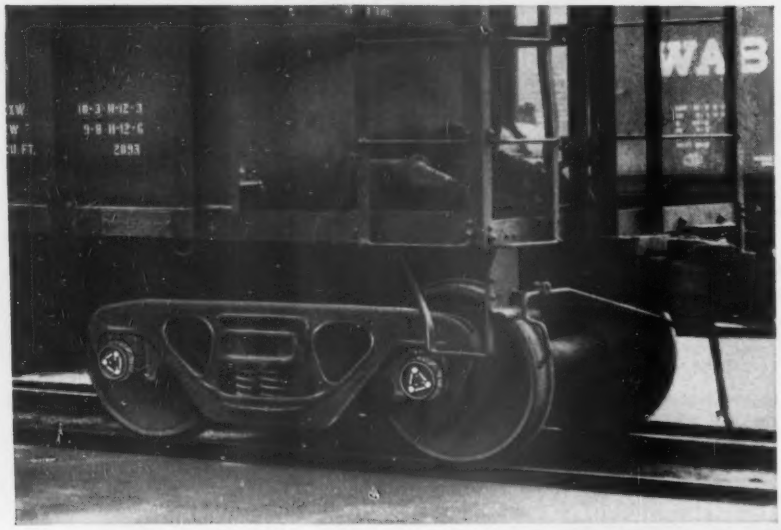
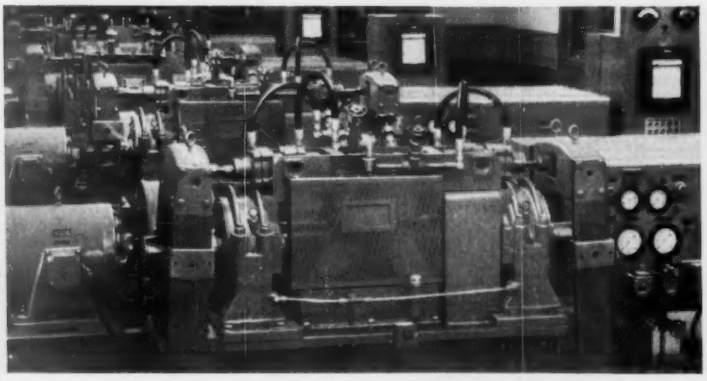
UNION CARBIDE

NEW HYATT TAPER WILL CUT YOUR OPERATING AND MAINTENANCE COSTS



A Hyatt taper freight bearing installed in a pedestal type side frame. Hyatt taper freight bearings may be used interchangeably with other freight car roller bearings. Either a wheel press or hydraulic jack can be used to press on bearings.

Bearing parts are inspected to close tolerances using ultra-modern inspection devices. Care, consistant attention to details, and strict control of quality insures uniform performance and complete customer satisfaction.



Precision proves itself here in the Hyatt laboratory where hundreds of the Hyatt taper freight bearings passed their tests under excessive radial and thrust loads at speeds far beyond any they could be expected to encounter in actual service.

FREIGHT BEARINGS

NOW IN VOLUME PRODUCTION

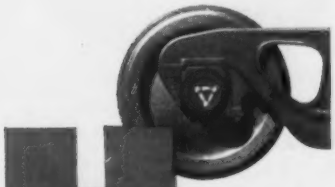
TO SERVE YOUR REQUIREMENTS FOR TOP QUALITY BEARINGS

You can virtually do away with costly maintenance and lubrication, and cut terminal bearing inspection time with Hyatt taper freight bearings. Pre-lubricated with a 3-year supply of A.A.R. approved grease, Hyatt taper freight bearings have a new double-lip, double-shield seal that holds the lubricant in and excludes dust, dirt, water and other foreign matter.

Manufactured to standards well above accepted commercial practice, Hyatt taper freight bearings incorporate the latest, newest and best in design, metals, seals and manufacturing. They're checked and double-checked to be sure that you get the finest bearings you've ever used.

Production quantities of Hyatt taper freight bearings are being manufactured in the 5½ x 10, 6 x 11, and 6½ x 12 sizes.

Join other leading railroads and look to Hyatt as your most dependable source for quality taper freight bearings.



Another GM GENERAL MOTORS contribution to railroad progress

HYATT

HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION, HARRISON, N.J.

Car-Wheel Tooling

Special machines and tooling are said to have reduced machining costs in the production of railroad car wheels in the cast-steel-wheel plant of the American Brake Shoe Co. in Calera, Ala. Production per machine has been increased from 3 wheels per hour turned and bored, to 25 wheels per hour bored and 9 wheels per hour turned, using two special machines with slug and "throw-away" carbide insert tooling.

A special boring head that permits three-step rough boring in one pass is used on the boring machine. Life per cutting edge of six square inserts averages 50 wheels of 255 Brinell hardness. Inserts are Kendex Grade K4h, along with the boring head. Boring is done at 90 rpm and .083 in. feed per revolution, removing 10 lb of steel.

On the turning mill, which runs at 30 rpm with .041-.062 in. feed and removes 50 lb of steel per 33-in. diameter wheel, insert life averages 2 to 5 wheels per indexable cutting edge. *Kennametal Inc., Dept. RLC, Latrobe, Pa.*

Rechargeable Flashlight Battery

A new Nicad rechargeable flashlight battery cartridge fits all "D" two cell flashlights. A removable cap permits recharging in any a-c 110-volt outlet. Recharging cycles are said to be a minimum of 250, with each charge giving 50% more continuous light than the average flashlight battery. The batteries, which are hermetically sealed, recharge to full capacity in 14 hr. *Gould National Batteries, Inc., Nicad Div., Dept. RLC, St. Paul 1, Minn.*

Hump Control Device

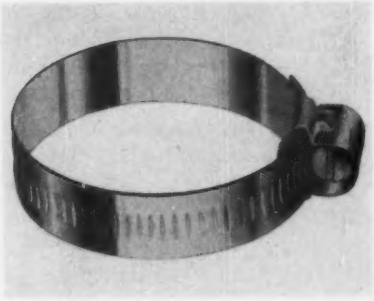
The Regohm is a compact hump control wiring device for use on locomotives equipped with amplidyne exciters, or with a-c exciters having static control. It eliminates the need to return the throttle to "idle" to re-establish normal throttle control, and is said to protect against vibration, dirt and wide temperature ranges. It is contained in a 2-in. square can. No maintenance is required. *Electric Regulator Corp., Dept. RLC, Pearl St., Norwalk 1, Conn.*

Grease Seal Tools

A 4-ton capacity hydraulic platen press, No. 21302, is recommended for use with a complete line of tools designed to remove and install grease seals and grease seal elements in Timken heavy-duty Type AP railway roller bearings and Hyatt Hy-Roll taper freight-car roller-bearing assemblies. Operation, however, may also be performed manually by utilizing screw power. The press is 28 in. high and 12¼ in. wide between uprights. Maximum daylight between platens is 13 in.; minimum, 8 in. The tools and the press were designed in cooperation with Timken and Hyatt. *Owatonna Tool Co., Dept. RLC, 679 Cedar st., Owatonna, Minn.*

Automatic Nailing Gun

A Powasert portable, single-blow automatic nailing gun drives 120 nails per min in sizes up to 2¼ in. long (8 penny) with heads up to ⅜ in. diameter. It can be used with older models of the power feeder-separator unit. Nails are dumped from bulk containers directly into the hopper which automatically aligns and feeds them one at a time, point first, through a flexible, transparent hose to the gun. The nose of the tool is pressed firmly against the work surface when the safety-release lever is depressed; the air-driven mechanism instantly inserts a nail vertically, horizontally, upside down, or at any angle. The gun weighs 9 lb; operates on 95 lb psi air, consuming 20 cfm at top speed, and covers a 15-ft radius from the wheel-mounted hopper. *Powasert Dept., United Shoe Machinery Corp., Dept. RLC, 140 Federal st., Boston 7, Mass.*



Hose Clamp

The new Marman hose clamp, unlike worm-drive type clamps, has no perforations through the band to cause extrusion or scuffing of rubber. The steel screw, which engages on coined threads, is encased in the housing to allow easy, positive screwdriver engagement. The clamp provides uniform

(Continued on page 17)

Wise purchasing men look for the use-value of cleaning compounds

All cleaning materials have the same general *use* (that is, to clean). But certainly not all of them have the same *value*. The *use-value* of a cleaning compound is determined by its performance.

The *value* of a cleaning compound's *use* is said to be high when its performance record shows definite savings in manhours . . . better results . . . less consumption of material for the job. Oakite cleaning compounds have a reputation for delivering high *use-value* performances.

The specific *use* of Oakite 88, for example, is to wash car exteriors clean. The solution loosens all grime, grease and road soil for easy, complete rinse-away and drying without streaking coaches or windows. One railroad reported that Oakite 88 did all this in a more dilute solution which saved hundreds of dollars over former material within just one month. That's Oakite *use-value* for you!

If you agree that lowest on-the-job cost and high *use-value* are proper yardsticks for buying, why not see how the local Oakite man can help you? Consult him or write for free Bulletin. Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

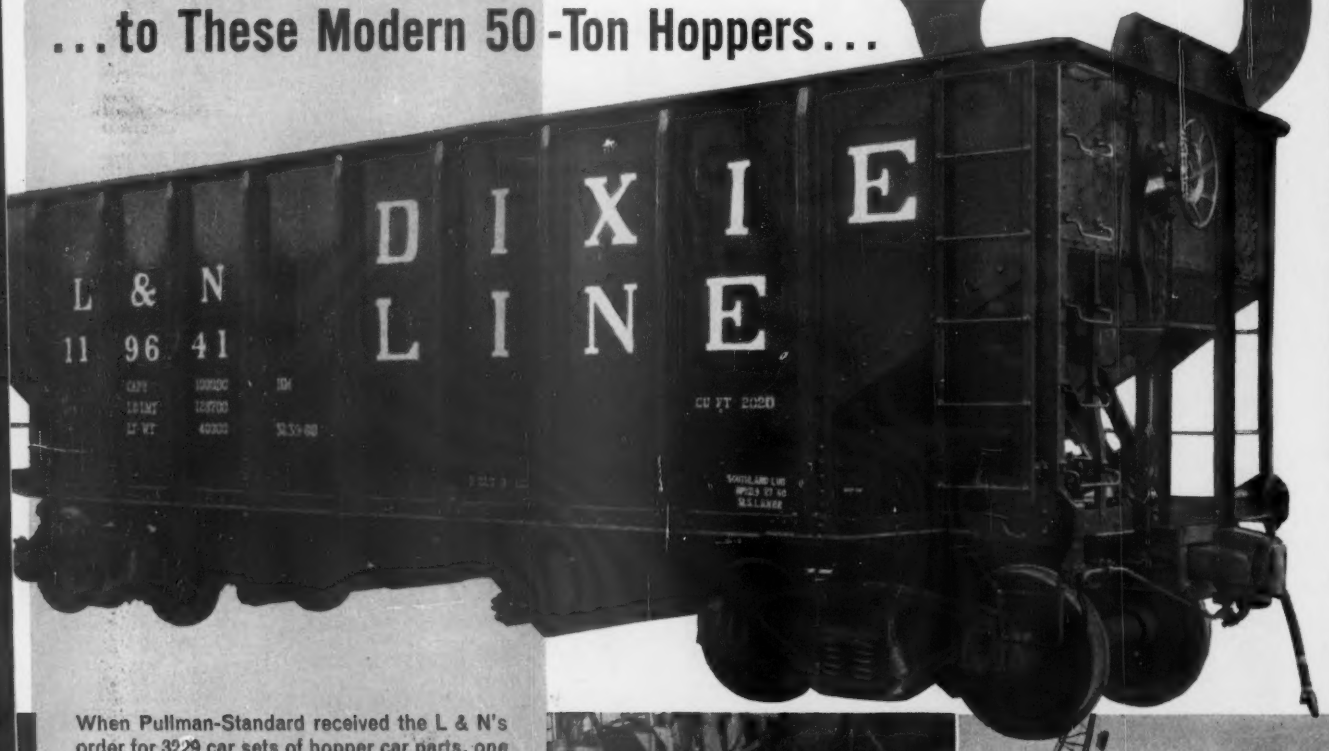
OAKITE

SCIENCE

over 50 *Est. 1909*

years' leadership in industrial cleaning

From Old Cars Like This ...to These Modern 50-Ton Hoppers...



When Pullman-Standard received the L & N's order for 3229 car sets of hopper car parts, one of the largest rolling stock rebuilding programs in railroad history was under way. Service worn 50-ton hoppers, each from 17 to 23 years of age, are being completely rebuilt by the L & N, from the center sill up. Sides, ends, hopper chutes, hopper doors, in fact all parts, are new and fabricated by Pullman-Standard.

Hopper cars selected for rebuilding enter the L & N Strawberry Dismantling Yard where car bodies are cut from the center sill and trucks. The underframes and trucks then move to the South Louisville Shop rebuilding line, named the "Blue-Chip Line." Each car receives 140 new parts or assemblies, applied station-by-station in the rebuilding process. To handle the logistics of approximately 500,000 parts, large and small, the L & N and Pullman-Standard have established a shuttle service of materials cars between the P-S Plant at Bessemer, Alabama, and the L & N Shops at Louisville. Pullman-Standard production and delivery schedules have been geared to "Blue-Chip Line" needs. This means P-S tested and proved hopper car parts, precisely fabricated for proper assembly match-up, are arriving in pace with the twelve-car-per-day rebuilding schedule.

The ability to program and meet production schedules with quality, precision-made, experience-proved parts is one of the reasons Pullman-Standard was selected as the supplier to the L & N "Blue-Chip Line."

229

TIMES BY THE L&N

Nearly a Half-Million car parts made by Pullman-Standard are assembled on the L & N "Blue-Chip Line."

"BLUE-CHIP," START TO FINISH

1. Service worn veterans like this L & N No. 61955 arrive at the L & N Strawberry Yard in Louisville.
2. Automatic welding machines at P-S Bessemer Plant speed quality fabrication of new hopper car sides.
3. Shuttle service L & N materials cars are loaded at Bessemer bound for the L & N South Louisville Shops.
4. Strawberry Yard cranes remove torch-cut car bodies from undercarriages.
5. On the "Blue-Chip Line" underframes are repaired and refurbished to accept new parts and assemblies.
6. Position by position, on the "Blue-Chip Line," new P-S hopper car parts are applied.
7. New side assemblies are bolted into position while firmly held with hydraulic rams.
8. New P-S ends go on as units. Quality fabrication provides proved assembly strength.
9. Special reamer speeds fit-up as car moves toward final assembly, truck rework, finish paint and shipping.

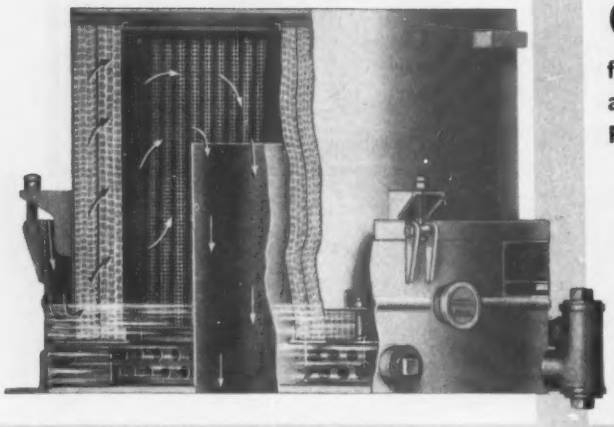
LEADER TO PROGRESS! P R I MEMBER

PULLMAN-STANDARD

A DIVISION OF PULLMAN INCORPORATED
200 SOUTH MICHIGAN AVENUE, CHICAGO 4, ILLINOIS
BIRMINGHAM • PITTSBURGH • NEW YORK
J. C. FENNELLY COMPANY, SAN FRANCISCO REPRESENTATIVE

One of these

Air-Maze Filters Will Upgrade Air Filtration on Your Diesel Engine!



Air-Maze OIL BATH Filter

for heavy airborne dirt loads and minimum servicing. First choice because...

- Removes up to 97% of all objectionable dirt from intake air!
- Requires minimum servicing...normally only semi-annual oil changes and annual cleaning.
- No special oil required ... uses same type lube oil as in engine or air compressor.
- Filter media is constantly washed with oil. It remains at peak efficiency even under extreme airborne dirt conditions and at varying operating ranges...idle to full load.

Air-Maze PANELBATH Filter

for effective dirt removal under average operating conditions. Out-performs other panel or centrifugal type filters because...

- Provides more effective filtration.
- Use of proven oil bath media with controlled baffle assures effective oil wash, dirt arrestance, clean media and settlement of pre-collected dirt.
- Operates longer between cleanings ... usually 90 days between cleanings. No special oil is required.
- Simple, inexpensive installation in existing vertical panel adapters on air intakes.

THE BEST NAMES IN DIESELS ARE PROTECTED BY AIR-MAZE FILTERS

GEARED TO PRODUCE P R I MEMBER

Contact your locomotive builder or write us for further details.

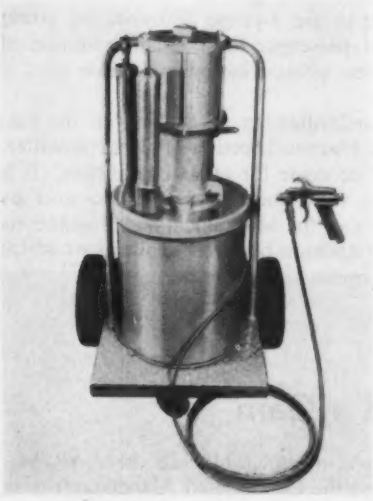
AIR-MAZE
CLEVELAND 28, OHIO
A SUBSIDIARY OF ROCKWELL-STANDARD

ROCKWELL R STANDARD

Engine Air Filters • Car Body Filters • Spark Arresters • Lube Oil Filters • Passenger Car Filters

WHAT'S NEW IN EQUIPMENT—*(Continued from page 12)*

clamping pressure and will not distort thin wall tubing. It is available in a wide range of sizes and in a choice of materials. *Advertising Department, Marman Division, Aeroquip Corp., Dept. RLC, 11214 Exposition Blvd., Los Angeles 64, Calif.*



Airless Spray Painting

The HydraAirless 30 system for airless spray painting has been designed to take advantage of the total atomization H-gun introduced early this year. The system features the Atlas II high-pressure reciprocating pump designed expressly for airless spraying. The long-stroke pump is powered by a 5½-in. air motor of balanced design. It has a 30 to 1 ratio, with operating pressures up to 3,000 psi, and will handle up to four guns, either manual or automatic. Materials which formerly could not be sprayed can now be handled by the system which, heated or unheated, fixed or portable, is available in 10- and 55-gal sizes and as a standpipe unit for circulating systems. *Speed-Flo Co., Dept. RLC, 6614 Harrisburg, Houston 11, Texas.*

Impact Tool

The Size 844 Air Impactool, which has a capacity of 1½-in. bolt size, enables one man to handle heavy nut- running jobs usually requiring two men. The tool weighs 33 lb without the socket; is 1⅜ in. shorter than its predessor, and has a ⅜-in. hose connection pipe tap. Its length is 14¾ in. measured to the shoulder of the spline drive, and side to center distance is 2½ in.

A 20% power increase is achieved with a 6-vane motor with large area vanes and specially ground cylinder. Free speed is

3,500 rpm at 90 psi air pressure. A newly designed impact mechanism has an average rate of 700 impacts per min at 90 psi. *Ingersoll-Rand Co., Dept. RLC, 11 Broadway, New York 4, N. Y.*

Synthetic Rubber Lining

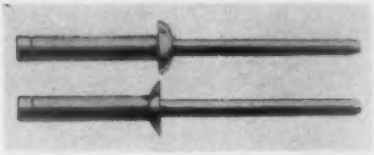
CPD-10 is a synthetic rubber lining of neoprene pre-cured by radio frequency energy. It is being used in electroplating tanks, chemical storage tanks, and feedwater tanks. It is suitable also for use in railroad tank cars and has been used to combat resistance to abrasion, oil, ozone, weathering, chemicals, flame, oxidation, and heat up to 250 deg F. In some applications it is said to have withstood temperatures up to 400 deg F. *Udylite Corp., Dept. RLC, Detroit 11, Mich.*

Welding Gun

The Model AH60-B air-cooled push type welding gun and wire feeder for use with the gas-shielded metal-arc (Aircomatic) welding process has a 60-deg goose-neck nozzle assembly for welding in hard-to-reach places, and a lever type trigger for ease of operation. It can be used with Buried arc welding and Spray arc welding using CO_2 as a shielding gas, or standard Aircomatic, using argon as a shielding gas. The wire feeder has a remote speed control with 15 ft of service cord which permits wire feed speed adjustment up to 600 in. per min. near the work. The feeder, Model AHF-D, operating on 115 volts, 60 cycle a-c, can be used either with constant arc voltage or Fillerarc motor generator power sources. *Air Reduction Sales Co., a division of Air Reduction Co., Dept. RLC, 150 East 42nd st., New York 17.*

Reefer Car Door Gasket

A refrigerator car door gasket of Du Pont neoprene synthetic rubber is now being applied on plastic car-door liners being installed on 1,025 new temperature controlled refrigerator cars of the Pacific Fruit Express Co. The gasket, which is expected to last the life of the car is said to be unaffected by low temperatures and resistant to corrosive materials, such as condensed moisture, brine, and acids found in refrigerated meat cars. Because neoprene is ozone resistant and is not easily deformed, the one-piece gaskets are said to be easier to install than any other, requiring only an adhesive, adequate pressure, and staples at each corner to hold them in place until the adhesive dries. *Landis Industrial Co., Dept. RLC, 1525 Alviso St., Santa Clara, Calif.*



Commercial Rivets

New Cherry commercial rivets, both for production manufacturing and for repair, have minimum blind side clearance, adapta-

(Continued on page 69)

EDITORIALS

Power on Land and Wheels

Longer than any living person can remember, it has been the practice of railroads to make sudden drastic cuts in operating costs after business has been bad for some period. These cuts involve personnel and nearly all expenditures that can be curtailed without materially interfering with railroad operation. It is evidently done with the conviction that business will eventually get better and when that happens furloughed personnel can be returned to work and equipment suffering from deferred maintenance can be restored. Unfortunately, when this comes to pass, many men, usually the better ones, have found other employment and can not be found. Also deferred maintenance which can involve hazards, is always expensive maintenance.

The Association of American Railroads has decided to follow such procedure within its own organization. Among other things, decision has been reached to dissolve the Electrical Section, its work to be taken over by members to be appointed to existing committees of the Mechanical and Engineering Divisions. The Electrical Section includes 18 technical committees, 17 of which reported this year. Several of them are concerned with liaison between wayside power supply and motors, generators and batteries on cars and locomotives. The work of assuring continuous power to cars under all operating conditions was in progress but there is much still to do. Furthermore new applications of electrical equipment on cars are being made constantly and unless the work is guided, they may cause expensive confusion.

The use of electric motors on freight cars is growing rapidly. Elsewhere in this issue is a description of a produce car which uses nine motors for loading and unloading. At the moment it is an isolated application, but it seeems probable that the use of such cars will be extended. The motors require 110/220-volt single-phase a-c, power.

Recently equipped covered hopper cars have 12-volt electrical systems to insure ventilation of lading. The cars are equipped with generators and batteries. These normally make the car self-sufficient but it seems probable that in some cases wayside power should be available.

Another new application of power on freight cars consists of axle-driven generators on piggy-back flat cars which supply power to trailers on the car. The trailers carry batteries which are supplied by the truck tractor generator on the highway. Wayside power is not used, but separable electrical connections between car and trailer are required. If such cars are used in interchange, standard connectors and power supply will be needed.

The greater number of caboose cars in service use 12-volt d-c, and some with 120-volt a-c power supply the needs of communication. Others also have power for lighting, and it has been suggested that caboose tracks be served by 3-wire, single-phase, 120-volt a-c power. Similarily it is proposed that maintenance of way or work equipment cars be supplied with the same kind of power but with plugs and receptacles of greater capacity.

The largest present need for wayside power is that for refrigerator cars. They have self-contained power plants but it is not desirable to run these plants in all locations where refrigerator cars must go. In such locations it is usually the practice to use 3-phase 220-volt, a-c power such as is used for passenger cars. Standardization of plugs and receptacles, phase-rotation and cable sizes is necessary.

Such railroad standardization needs have in the past been supplied by the Electrical Section's Power committee. Similar cases could be made for other committees. It is urgently hoped that when their work is taken over by members respectively of the Mechanical and Engineering Divisions, that consideration be given applications which concern both departments.

A Loss and a Gain

In 1954 the annual meetings of both the AAR Mechanical Division and the Coordinated Associations were cancelled. The complete absence of mechanical department get-togethers that year created a void in personal communications that no amount of distributed committee reports could fill. Next year, as an economy measure, the Mechanical Division will not hold its annual meeting. But fortunately for the industry the Coordinated meetings will be held as scheduled during the week of September 10, 1961.

We believe meetings are essential for the continued health of the Mechanical Division because it suffers a distinct loss when personal contact is missing between the official organization and the membership. Yet the manner in which the division operates through established committees permits the cancellation of one annual meeting without too serious a loss in the value of the year's work. The important reports prepared by these committees are subject to critical study and to approval by vote of the membership. By this vote the members can protect themselves from recommendations they consider ill advised and, therefore, discussions at an annual meeting, while valuable, are not indispensable.

In contrast, the Coordinated Associations work loses much of its value when meetings are not held. Discussions of their committee reports from the floor are of prime importance in ferreting out the best means to effect economies and make improvements in locomotive and rolling stock maintenance and operation. For that reason we say the railroads are fortunate that the Coordinated Associations will meet.

New Mainline Motive Power

FROM GENERAL ELECTRIC

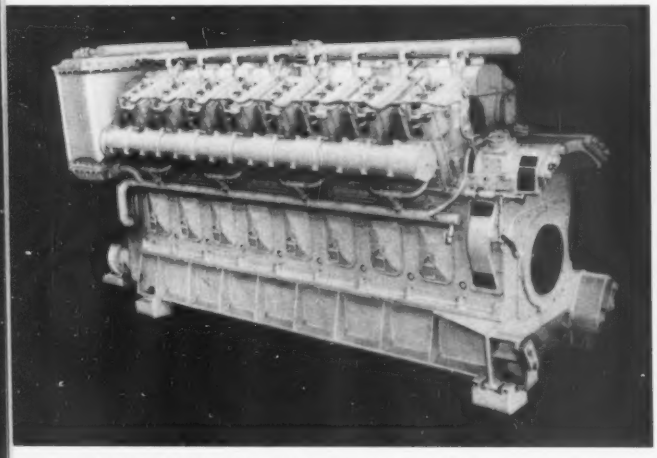
The General Electric U25B twenty-five hundred horsepower diesel-electric mainline locomotive — new from the rails up, with more power, less machinery — 65,000 pounds, 625-hp per axle — rugged simplicity over every inch of its length — a new standard of mainline motive power to provide faster, more reliable service at minimum cost.

For U25B Features that Make Possible New Levels of Mainline Performance, Turn to the Following Pages

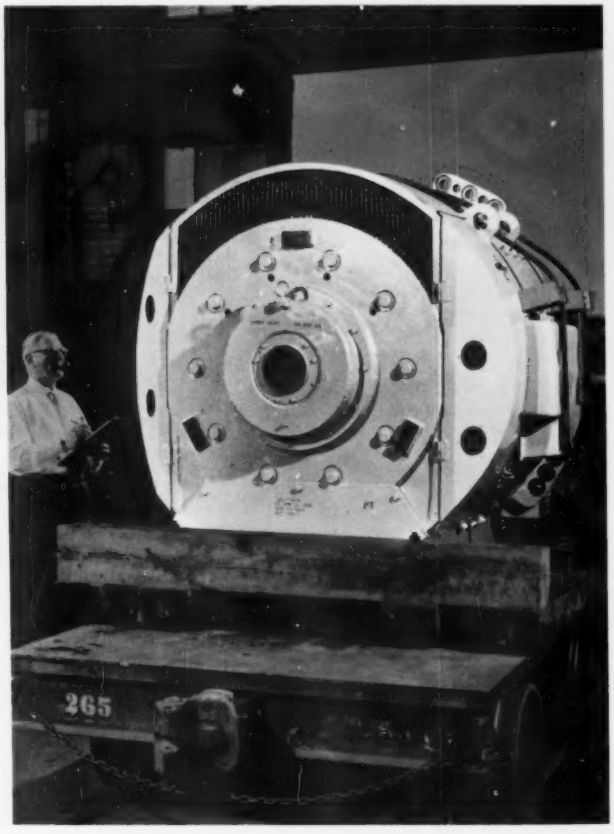
NEW GENERAL ELECTRIC U25B MAINLINE LOCOMOTIVE

first all-new diesel-electric locomotive in 15 years

. . . a carefully integrated design to meet the requirements of a new era of fast freight railroading, greater railroad competitiveness and profitability. *More power* — 50% greater than average mainline diesel-electric locomotives — enables the U25B to move freight faster. *Rugged simplicity* — 60% fewer electrical components, simplified mechanical design — establishes new standards of locomotive reliability and reduced maintenance. *Clean air* — through self-cleaning mechanical filters — reduces both cleaning costs and mechanical wear. The power, simplicity and cleanliness of the U25B offer significant savings in operating costs. With new G-E U25B locomotives, you can plan for maximum return on your equipment investment.



***MORE POWER IN THE DIESEL ENGINE** — twenty-five hundred horsepower — gives the new General Electric U25B diesel-electric locomotive 50% greater power than average diesel-electric units now in mainline service. And, the U25B has ample capacity to meet the challenges of tomorrow's faster traffic schedules, or to maintain your present schedules with fewer units.*

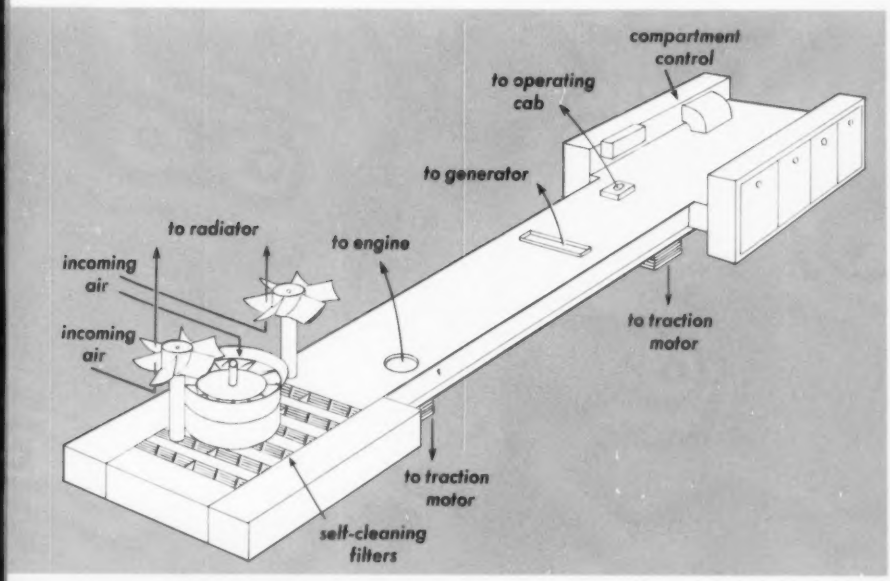


***NEW MAIN GENERATOR HAS AMPLE CAPACITY,** meets peak load requirements with generous safety margin, is specifically designed for the high-powered General Electric U25B locomotive. New insulation system gives maximum protection against heat and moisture, adds another element of reliability to this General Electric locomotive.*

HIGHER ROAD SPEEDS
FASTER SCHEDULES

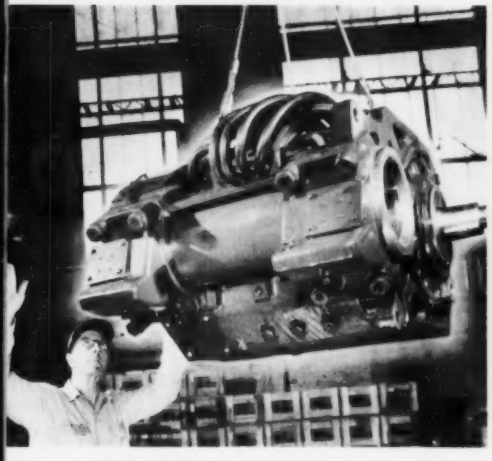
GREATER RELIABILITY
FEWER ROAD DELAYS

LOWER OPERATING COSTS
GREATER PROFITS



***NEW FILTERED AIR SYSTEM** on the U25B — a major advance in locomotive design — assures longer apparatus life, greater reliability, lower cleaning costs. All air (except for radiators and dynamic brake) is supplied by one blower through self-cleaning mechanical filters.*

***NEW ENGINE COOLING SYSTEM** on the G-E U25B locomotive eliminates all electrical devices and radiator shutters.*



***POWERFUL GE-752 TRACTION MOTOR** —proved by millions of miles on high-powered diesel-electric, gas-turbine-electric and straight electric locomotives — assures rugged dependability, capability of continuous ratings exceeding 700 horsepower—another G-E added value.*

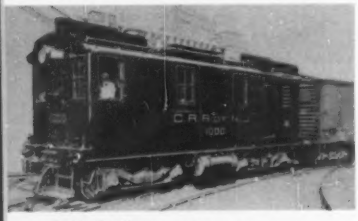
***NEW ADHESION LOSS DETECTOR** — fast responding, the most effective automatic slip detection and correction method available — detects slips and slides at all speeds, corrects slip by a light application of independent air brakes before damage occurs.*

***NEW PRESSURIZED CONTROL** compartment houses rugged, heavy duty components — seals out dirt and moisture, virtually eliminates routine maintenance. Compartment on the new U25B locomotive invites white glove inspection.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

1895 *First Mainline Electric Locomotive*



1924 *First Diesel-Electric Locomotive*

1956 *Universal Diesel-Electric Export Locomotive*

1957 *Rectifier-type Freight Locomotive*

1958 *8500-hp Gas-Turbine-Electric Locomotive*

1960 : A NEW STANDARD OF MOTIVE POWER

Since 1890, General Electric has worked in partnership with the railroads to develop pioneering and continuing advancements in motive power. Seven years ago, the American railroad industry helped General Electric plan a new locomotive concept. The industry asked for a new locomotive . . . with greater horsepower . . . on four axles . . . reliable and economical to operate . . . and of simple design. Based on these present and future railroad needs, G-E engineers developed a new locomotive, combining a new, integrated approach with proven components.

THE GENERAL ELECTRIC U25B IS THAT LOCOMOTIVE

For further information about the new U25B, contact your General Electric Apparatus Sales Office or Locomotive and Car Equipment Department, General Electric Company, 2901 East Lake Road, Erie, Pennsylvania. 105-01

Progress Is Our Most Important Product

GENERAL ELECTRIC

Sequence of maintenance operations is completely outlined for each of the spots. Ogden Shop General Locomotive Foreman R. H. Sixby points out one operation to W. G. Foote and E. C. McQuarrie, machinist foremen. Work is arranged so there is minimum of interference.

SP Puts Diesel Maintenance on 'Spot'

EMD road freight locomotives move through series of work stations while undergoing periodic maintenance

Careful analysis and scheduling of maintenance and periodic inspections have enabled the Southern Pacific to increase the output of its Ogden, Utah, locomotive shop. The result of these studies has been the establishment of a four-spot diesel repair system for General Motors F-type road freight units.

In February 1960 Ogden shop turned out 47 annuals, an increase of 22% over 1958 when an average of 13.9 annuals were out-shopped monthly. Precise scheduling, not a speed-up in operations, made this possible. The spot system went into operation on February 1, 1959. This was followed by re-evaluations in May 1959 and March 1960. Presently, each day's output is approximately 1.7 annuals, 3 semi-annuals and 14 "others," which include monthlies, quarterlies, and running repairs. Work is allocated to each of the four spots so workmen progressively perform maintenance operations with a minimum of interference.

When the system was first established, manufacturer's specifications were used as the basis for the maintenance and inspections. This was not too satisfactory, particularly with regard to running repairs and the need to keep motive power on the road. For over two months, road foremen and others rode locomotives over the Salt Lake Division, which extends 538 miles to Sparks, Nev., to determine the common and recurrent causes of trouble. These riding reports, along with enginehouse foremen's observations, were consolidated with the ICC requirements to outline necessary preventive maintenance. A two-day check was then made at each spot to insure continuity, adequate coverage, and proper spacing of the various repair and maintenance jobs.

Four "spots" are established on each of three through tracks covered by a 125-ft roofed extension at the west end of the Ogden shop. All annual work is done on Track 15. Monthly and quarterly inspections and running repairs, such as removal of leaking heads and liners, are handled on Track 14. Semi-annuals and heavy

Four EMD F units are spotted on "North Forty" for preparation prior to moving into the four spots on Track 15. These locomotives will be undergoing annual inspection in the shop.

Extension of original Ogden shop (rear) puts all four of the spots on each of the tracks under cover. Translucent panels in the shop extension ceiling increase the natural illumination.

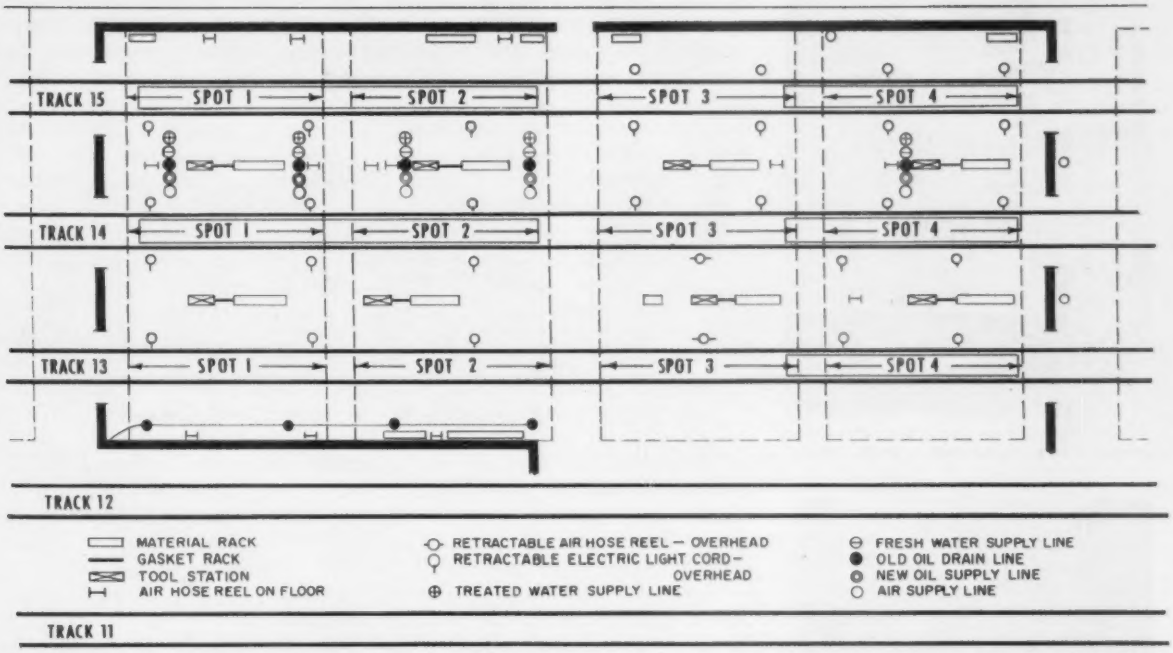
breakdowns are processed on Track 13. Time intervals on spots vary, depending on the track and work assigned to it. Annuals require 8 hr for each spot. Monthlies and quarterlies and running repairs are alloted 45 min. Semi-annuals require 2 hr at each spot. In other words, an annual moves from Spot 1 through to Spot 5 in 32 hr; a semi-annual is completed in 8 hr; running repairs, in 3 hr. When work load permits steady operation, a running repair leaves the shop every 45 min and a semi-annual every 2 hr. The present work schedule is one shift on Tracks 13 and 15, and three shifts on Track 14.

Units move through the shop from south to north. Tracks 13 and 14 have an advanced spot where some work is done prior to placing on Spot 1. This includes removal of carbody filters, false ceiling, all doors, panels, and covers on all electric cabinets, generators and motors inside the carbody. The motors, generators, and cabinets are blown. Covers are taken to the lye vat, cleaned, and returned to the unit. Carbody filters go to the filter room for reconditioning.

On Track 14, where running repairs and monthly and quarterly tests are made, a total of 20 men are assigned on the day shift. These include 5 machinists, 2 machinist apprentices, 2½ machinist helpers, 3 electricians, 2 electrician apprentices, 2 pipefitters, 1 boilermaker, ½ boilermaker helper, ½ carpenter, ½ painter, and 1 laborer.

Racks between spot locations have all the materials for repair and maintenance operations which are assigned to that particular site.

Hose reels between the tracks supply lubricating oil and compressed air. Hose also can be connected to unit to drain used lube oil.



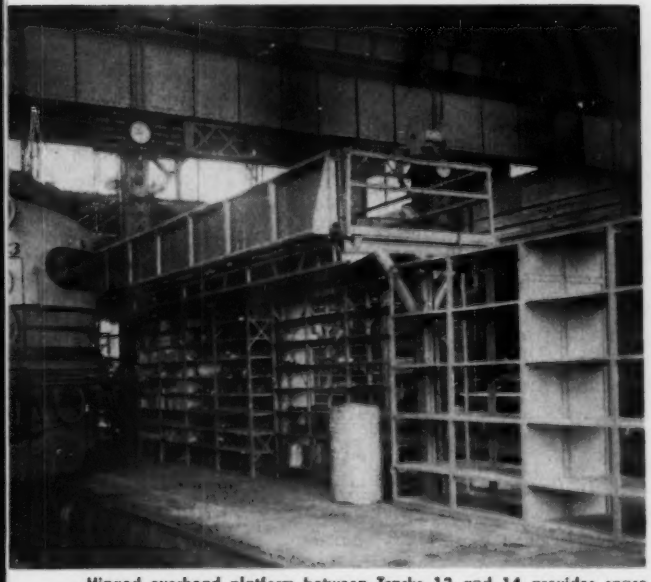
Spots 3 and 4 on each of the tracks are in the original shop building; Spots 1 and 2 are in the extension. Truck work is done on Track 12.

After the unit has been prepared at the advance spot, it moves in on Track 14 to Spot 1 where the engineman's inspection report, SP Form 2326, is checked.

Spot 1. Here there is an inspection of top deck, pistons, rings, liners, and crankcase, including gaskets, rods, and main bearings. The engine is checked for water and oil leaks, and the emergency fuel trip is also inspected. Traction-motor covers are removed and the motors including leads, are inspected. Weather stripping and glass in cab doors and windows are renewed, if necessary, and door operation is checked. Sanders are aligned. Pipe work for machinists and electricians is started. During quarterlies, lead readings and blow-by tests are made, and the air gages are disconnected and removed.

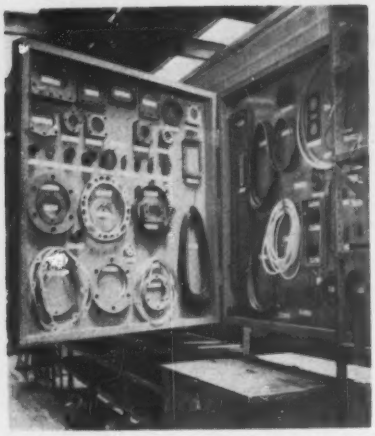
Spot 2. Engine filters are changed. Generators, motors, load regulator, control drum, and contactors are inspected and repaired. Reversers, contactors, and regulators in high-voltage cabinets are wiped and lubricated. The Mars light and its motor generator set are checked. Megger tests are made on the high- and low-voltage d-c and the a-c circuits. Traction motors are blown. Covers, doors, and traction-motor covers are then replaced. The lamp enclosures are checked. The steam generator is washed, if the unit is so equipped. Nose end floors, and unit steps are roughened.

Spot 3. Brake shoes are replaced;



Hinged overhead platform between Tracks 13 and 14 provides space for removing Alco radiators. Platform is lowered after unit is spotted.

Time for each maintenance sequence is well established. For all jobs much emphasis is placed on lowering costs, increasing efficiency.



Gaskets and seals are stored by part numbers and are kept in closed cabinets at the "spots."

Storage rack for pipe fitting has specimen of each item mounted on outside of its container.

Suction strainers are placed in special racks. Such storage units are handled by lift trucks.

car-body filters are applied; piping and assembly work are completed.

Spot 4. Air gages are installed; false ceilings are applied; machinist work is completed, and interior of unit is cleaned including the washing of air-compressor, engine walls, and other components.

Spot 5. Hot work test.

The advanced spot for Track 15 where annuals are worked is north of the shop in the so-called "North Forty." Here there is a complete inspection and cleaning before a locomotive is moved dead to Spot 1. A clip board containing inspection form 2326 and work sheets is placed on the northwest end of all units when they are placed on Spot 1 of any of the three tracks. The board is kept in this location until the unit is moved off Spot 4. A work schedule is posted on a bulletin board at the center of each spot location. Each craft has a separate list detailing the work to be done. For example, the work at Spot 1 on Track 15 is covered by lists for the following workmen: machinist, machinist apprentice, electrician, electrician helper, carman, and laborer. Assignments are flexible, depending on the amount of work and the demand for the locomotives on each of the tracks. Apprentices, helpers, laborers, and some mechanics do follow up work on two or more spots on the same track and move to similar spots on other tracks.

When wheels are removed for wear or other defects, trucks and traction motors are worked. Truck changes are done on Track 12, one of the shorter tracks in the main shop building. A 100-ton overhead crane lifts the locomotive off the trucks, which are then sent to the truck shop. Extra trucks with traction motors are available. Repairs, such as blowing, cleaning and brush changing, are done on "spots."

Roof hatches are removed during all annuals so that complete sets of head, liner, and piston assemblies can be changed out. Bearings are renewed, if necessary, at the same time. Cleaning and repairing of auxiliary equipment, both electrical and mechanical, is done on the unit, unless removal and replacement are necessary.

Air-brake equipment is removed and replaced with pool material which is cleaned and repaired in the shop. Air-compressor work is done without removing compressors. If it is necessary to remove an engine or main generator, the unit is not placed on the spot system. Complete assemblies, such as governors, injectors, blowers, traction motors, and other electrical rotating equipment, are sent to one of the general shops for reconditioning. A working pool of these and other parts is maintained in the Ogden shop. Oil is changed every 90 days in EMD units. All filters for monthly, quarterly, and up to and including annuals are changed out at Spot 2 on the three tracks.

Each of the four spots has a distinctive color scheme to keep tools where they belong. Tool racks and tools are all painted the color of their respective spots. Color for No. 1 spots is red; for No. 2, yellow; for No. 3, green, and for No. 4, blue. Each spot has a complete set of tools. It is immediately apparent in working the spots if a red or yellow tool is being used in a green section. Racks at each spot also provide all necessary materials.

Southern Pacific has classified the maintenance and periodic inspections which are performed at Ogden. For freight units, there are five general classed based on locomotive life:

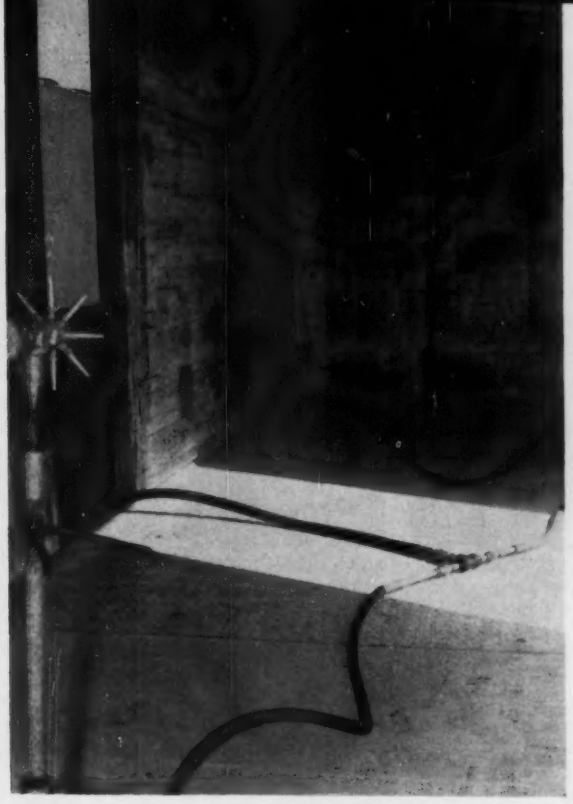
- 15-day, 30-day, 90-day, semi-annual and annual;
- 1-year, 3-year, 5-year, 7-year, 9-year, 11-year, 13-year, and 15-year annuals;
- "C" annuals at 2, 6, 10, and 14 years;
- "B" annuals at 4, 8 and 12 years;
- "A" annuals—16 years (complete stripping).

Main bearings and power assemblies are removed every two years. During the "B" annuals, the accessory end drive gear and harmonic balancer springs receive attention.

Passenger locomotives are assigned to Ogden shop for single-spot inspections and for periodic work. The two classifications of passenger locomotive work are:

- Annuals at 1, 2, 3, 4, and 5 years;
- "A" annuals—8 years (complete stripping).

Ogden shop maintains 204 assigned diesel units. These include 138 EMD F-type freight units, 42 Alco passenger units, 4 Alco 1,600-hp branch-line switchers, and 19 Alco 1,000-hp switchers. Freight units average 10,000 miles a month; the passenger units, 22,000 to 24,000 miles. Ogden shop also does most of EMD annuals for the Northern District, which includes the Sacramento, Portland, and Shasta Divisions.



Interior sides of car doors, which are closed during washing, are also cleaned by the high-pressure detergent. Hose is connected to detergent pipe line. Other pipe contains rinsing water.

Spray heads which deliver detergent and rinse water are mounted on stands. Placing one stand in each end of box car makes it possible to clean interior of car completely.

Washing Gives NH More 'A' Cars

Cleaning with high-pressure detergent is making more box cars available for high-grade ladings

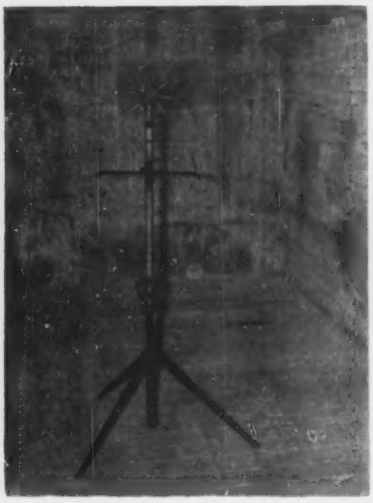
Thorough cleaning of the interiors of box cars frequently is all that is necessary to make it possible for these cars to be offered for loading of the highest grade commodities. About two years ago the New Haven began to try various methods of interior cleaning to make more Class A and Class B cars available for its customers. After about 18 months' development, the road settled upon a system which uses a detergent solution delivered throughout the interiors of cars by portable, tripod-mounted, high-pressure, rotary-spray nozzles.

Results were so good that the road has now rebuilt its car-cleaning tracks at Cedar Hill Yard just outside New Haven, Conn., so that this system can be employed. The two 1,200-ft tracks can hold approximately 80 cars. They are located on 18-ft centers, and the outer rail of each track is elevated approximately 3 in. so that the cleaning solution and water delivered inside a car during the process of washing and rinsing will drain. The two tracks are laid on approximately 2 ft of stone ballast, and there have been no drainage problems in the work area. At one end is a pump house which also contains a mixing vat for the Turco Jet 1 cleaner which is used. The washing solution and clear rinse water are delivered in two pipe lines which run down the space between the two clean-out tracks. Each morning cars are placed on these tracks for dunnage removal. The blocking, paper, and other debris shovelled out of the cars is piled on the outer sides of each of the two clean-out tracks. From these, it can readily be moved to be burned or dumped.

The crew which handles the washing follows behind the men who remove this heavy debris. The cleaning solution is delivered from the pump house in a 2-in. line and the flushing water in a 4-in. line. At 80-ft intervals along each of these lines are outlets equipped with valves and snap-on hose fittings.

Heart of the system is the Turco Dual-Jet washer which directs straight, high-impingement streams against all interior surfaces of the car. This is because of the dual-axis rotation which produces a non-repeating spray pattern throughout the space to be cleaned. The high velocity of these streams allows them to travel over 20 ft without bending or "feathering." This stainless-steel washer is manufactured to close tolerances. A strainer is necessary on the tripod stand to prevent clogging of the nozzles by foreign particles.

It has been found that two of the Turco Dual-Jet washer heads mounted on tripod stands will do an effective job of washing the interior of a 50-ft box car. The washing crew places a washing tripod about midway between the door opening and each end of the car. The doors are then closed prior to washing. The hoses from the tripods are connected to the snap-on fitting on the cleaning solution line, and



Tripod stand supports the spray head. Filter is incorporated in stand to protect spray head.

Washer rotates both in horizontal and vertical planes so jets reach all inside surfaces of car.

Washing interior of flour car at far left reveals upgrading patches not previously visible.

approximately 200 gal of this liquid is sprayed throughout the interior of the car at 240 psi pressure. A typical cleaning cycle calls for washing for approximately 2 min, followed by rinsing with 240 psi clear water for 3 min. These time cycles may be varied, depending upon the condition of the car interior.

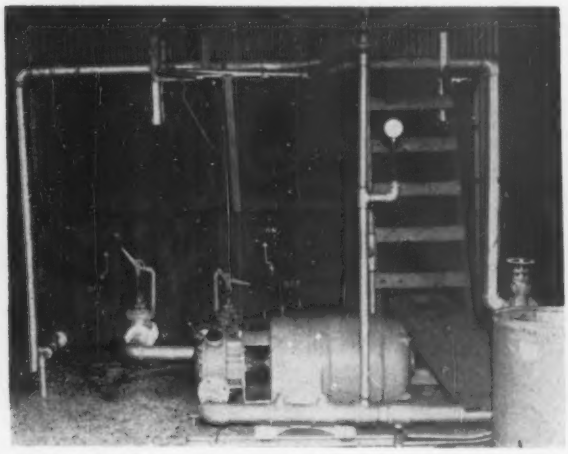
Following the mechanical washing of the interior, a man goes through and hoses down the floor of the car to remove debris which may not have been flushed out the doorway in the course of the high-pressure washing. He also completes the cleaning of the backs of the car doors. These doors are closed during the high-pressure washing, but may require some additional cleaning along the edges.

Normally, it takes from 7 to 10 min. for the complete cleaning of a car. This means that it is possible to do up to 35 cars in 8 hr, although, normally, the New Haven has found that only about 20 cars a day are washed. Only cars which can be classified as A or B are washed.

The pump house contains a two-compartment tank and a 3,600 rpm, 50-hp, 250 psi, 200-gal-per-min pump. The 1,400-gal compartment of this tank is used for mixing the Turco Jet cleaner and powder in water sufficient for cleaning six to eight cars. A 600-gal tank holds water used for rinsing and flushing. Both tanks are connected by quick-closing valves to the pump and are supplied by a flat valve connected to a 50-lb psi city supply. Beyond the pump, the two lines again divide. The New Haven adopted this system because only a single pump is necessary in the system. The entire installation, including rebuilding of the tracks and the installation of the pump and piping, cost approximately $25,000.

It is not planned to install any drying facilities. Because of the formation of ice in car interiors during freezing weather, the New Haven has now suspended its car-washing until spring. It will then be resumed, daily adding about 20 high-grade cars to the NH car supply.

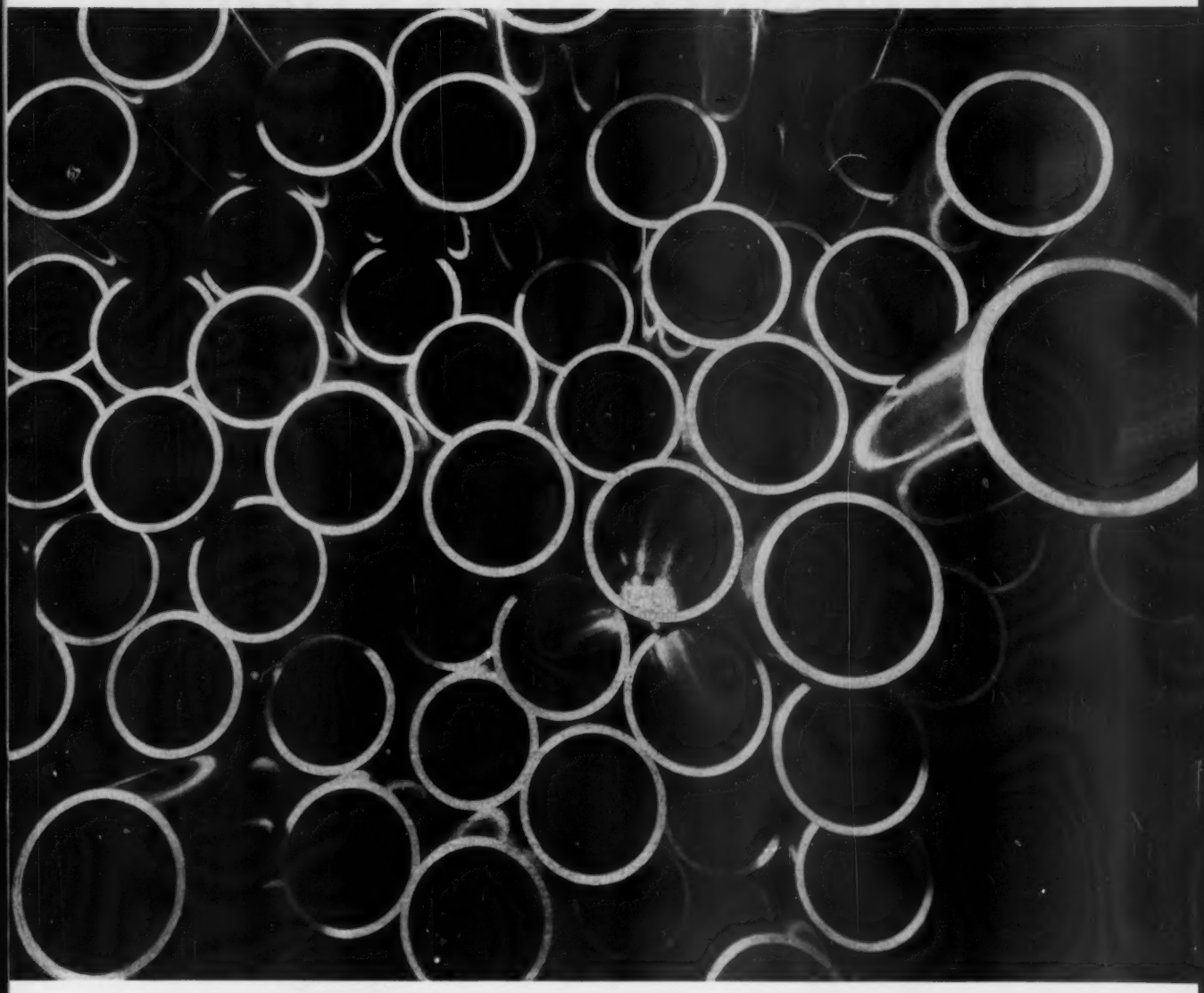
Results obtained with this cleaning system have been very satisfactory, according to mechanical and traffic officers. The number of Class A and B cars for high-grade loading has been increased substantially. Customers are better satisfied with the box cars which are placed for their loading. Finally, these results are being obtained without a substantial increase in car-cleaning costs.



Mixing tank and high-pressure pump are located in special pump house.

Car-cleaning tracks are tilted toward each other to drain the cars.

This mark tells you a product is made of modern, dependable Steel.



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Ken Discovers the A's Have It

By C. Charles

Ken and Slim, the road foremen of locomotives, were sitting in their office puzzling over the complaint made by one of their enginemen. While this engineman had been pulling his passenger train out of the station, the conductor signaled for a stop to allow two late passengers to board the train. Somewhat disturbed, the engineman removed his foot from the safety control pedal, which resulted in a penalty application of the brakes. When he placed the brake-valve handled in *Suppression* position to recover the penalty application, the brakes released.

Without discussion, Ken and Slim agreed this was serious. "You know," Slim finally said, "features of the 26-L equipment puzzle me. To be honest, I don't really know the score."

"Let's go over to George's office and go over this whole subject," Ken responded.

George, the air-brake instructor, was studying a 26-L brake manual as the two road foremen entered. Ken explained what had happened to the passenger train. "That locomotive must have a P-2 application valve on it," George replied immediately.

This is the fourth installment in a series on the 26-L brake. Part 3 appeared in the April 1960 issue of Railway Locomotives and Cars, page 41.

"What difference would that make?"

"Our 26-L units are now being equipped with P-2A application valves," George explained. "To show you the difference, let's look at both of these valves and at some of the other special devices which are involved in the 26-L equipment."

George opened his manual to the diagram of the P-2 valves and explained as follows:

Piping of the 26-L brake equipment can be connected to the P type of brake application valves so that a service brake applicaton will be initiated by a safety control, overspeed control, or train stop control.

With the locomotive equipment charged, main reservoir air enters port 30 of the P-2 Brake Application Valve and flows above and below the diaphragm of the spool valve assembly which is held in the *Release* position by the piston spring. The following connections are made:

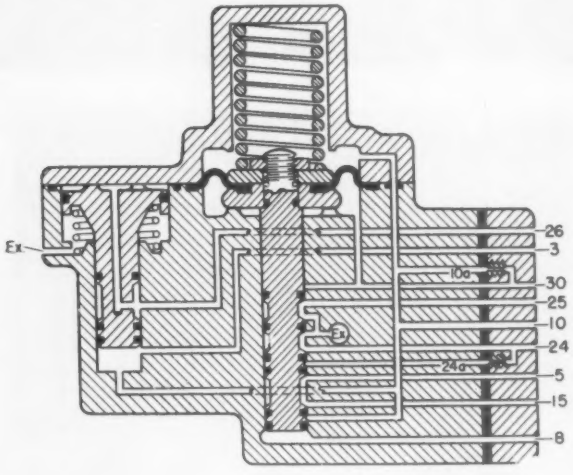
- Main reservoir air to port 10 and the timing reservoir, also past the bottom of the suppression valve holding the supression valve in its upper position, and to port 3 of the application valve, then to the foot valve and overspeed magnet;
- Equalizing reservoir charging pipe 15 connected through the spool valve to the equalizing pipe 5 makes possible charging of the equalizing reservoir and the equalizing reservoir chamber in the Relay Valve located in the Brake Valve.

During a penalty application initiated by safety control or an overspeed, air pressure is reduced in port 3 of the brake application valve which also reduces air pressure in the spring chamber above the diaphragm. Main reservoir air under the diaphragm overcomes the spring pressure about the diaphragm to force the spool valve assembly into its *Applied* position.

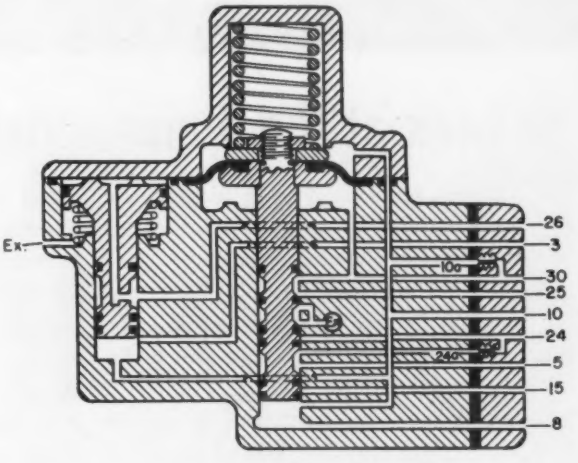
In *Applied* position, the spool valve makes the following connections:

- Main reservoir air in port 30 to port 25 and then to the PC pipe and switch;
- Main reservoir air from port 30 through choke 10A, and air in the chamber on the spring side of the diaphragm and the timing reservoir are connected to port 8 of the application valve;
- Port 8 is connected to the lock-over pipe which is connected to port 8 of the Brake Valve and thus the air is allowed to flow to atmosphere through the suppression spool valve or the brake valve;
- Equalizing reservoir charging air in part 15 is blanked at the spool valve;
- Equalizing reservoir air in port 5 flows through the choke plug to port 24 and into the reduction limiting reservoir, reducing pressure in the

(Continued on page 32)



Release Position



Application Position

George referred to these diagrams for the P-2 application in making his explanation. Numbered connections of this valve are as follows: 3—Foot Valve; 5—Equalizing Reservoir; 8—Lock-Over Pipe; 10—Safety Control Pipe; 15—Equalizing Reservoir Charging Pipe; 25—Power Knockout; 26—Suppression Pipe; 30—Main Reservoir Pipe, and 24—Reducing Limiting Reservoir.

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Ken Discovers the A's Have It

(Continued from page 30)

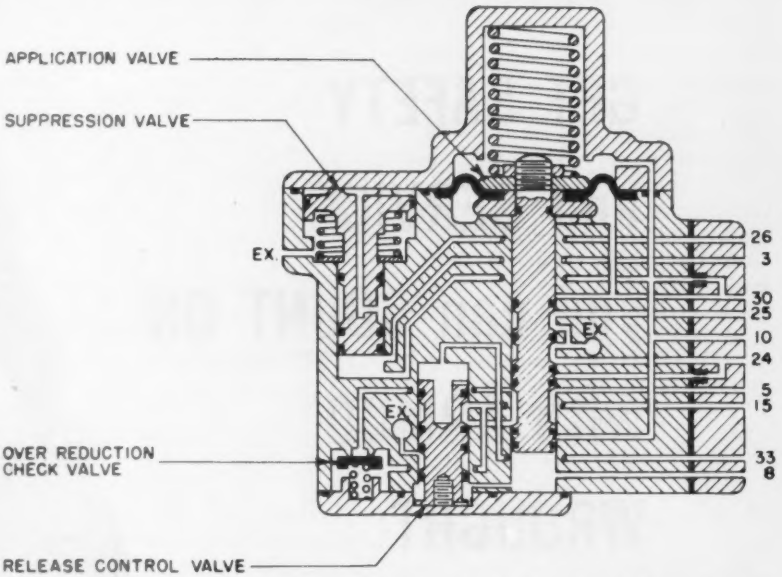
equalizing reservoir and equalizing reservoir chamber of the Brake Valve, causing the relay portion to reduce the brake-pipe-air pressure correspondingly, giving a service brake application.

To prevent a penalty application within the allowable delayed time, the Brake Valve handle is moved to *Suppression* position. This cuts off exhaust from port 8 of the Brake Application Valve. Main reservoir air in the brake valve flows through the suppression valve of the brake valve to port 26 of the brake valve and to port 26 of the application valve and then to the top of the application valve suppression valve. The suppression valve is moved to its lower position, cutting off the flow of air from the spring chamber side of the diaphragm —spool assembly and the timing reservoir to port 3. Main reservoir air, being suplied continually to port 30 of the application valve, now increases pressure on the spring side of the diaphgram until the differential moves the spool valve assembly to its lower or *Release* position.

During a normal brake application, brake-cylinder air is connected from port 30 of the Relay Valve to port 26 of the brake application valve, then to the top of the suppression valve. This pressure moves the suppression valve to its lower position, preventing the flow of air from the spring chamber and timing reservoir to atmoshpere, also preventing the operation of the application valve, which makes possible the release of the safety control foot pedal.

Having outlined the functions of the P-2, George went on, "We now use the P-2A Brake Application Valve which is a design improvement over the P-2 valve. The P-2A has two additional portions—the over-reduction check valve portion and the release control valve portion. Let's see what these do to improve performance.

"If brakes do not apply when the P-2A Brake Application Valve moves to *Applied* position in response to a safety control or an over-speed, the over-reduction check valve will make possible a further reduction of the equalizing reservoir pressure from the brake valve. By moving the brake-valve handle beyond the *Service* position, air in pipe 15 will flow to exhaust



To show improvements incorporated in P-2-A application valve, George used this diagram. The numbered connections are: 3—Foot Valve; 5—Equalizing Reservoir; 8—Lock Over; 10—Safety Control; 15—Equalizing Reservoir Charging; 24—Reduction Limiting Reservoir or Exhaust; 25—Power Knock-Out; 26—Suppression Pipe; 30—Main Reservoir; 33—Switch Pipe.

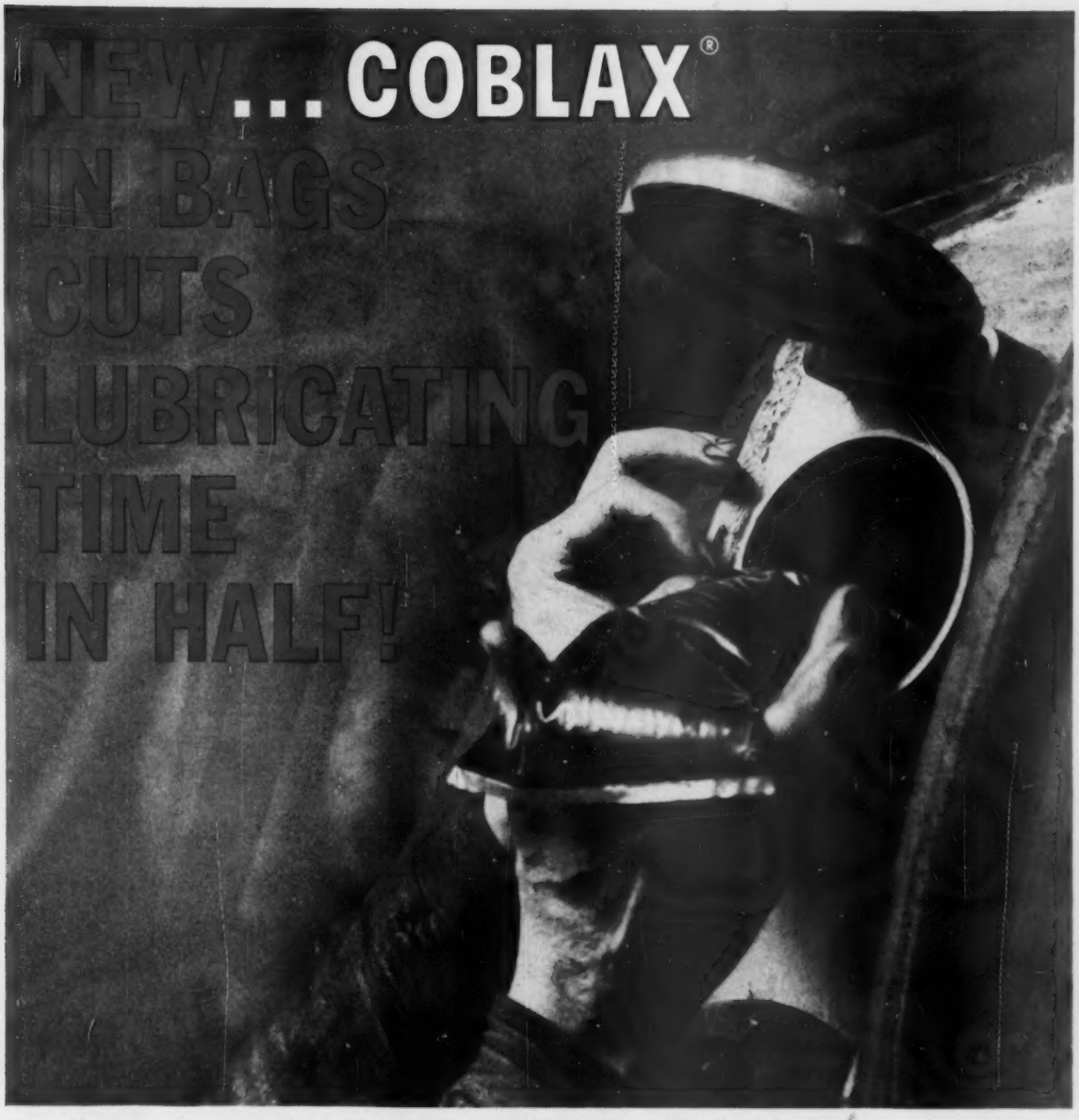
at the regulating valve, allowing air below the over-reduction check valve in the P-2A brake application valve to flow to exhaust. Equalizing air in pipe 5 above the over-reduction check valve moves the check down, allowing equalizing reservoir air to flow past the open check valve to port 15 of the brake application valve and through pipe 15 to exhaust at the brake valve, further reducing pressure in the equalizing reservoir and equalizing reservoir chamber, causing the relay portion of the brake valve to reduce brake-pipe pressure and insure a brake application.

"The release control valve portion insures against possible partial brake release when the equipment is set up for passenger service. When the brake-valve handle is placed in *Suppression* position following a brake application initiated by the safety control or break-in-two protection features, there will be no release.

"Following a penalty application, the brake-valve handle must be placed in *Suppression* position, so the suppression valve cuts off exhaust from port 8 in the brake valve and port 8 in the application valve. This allows main reservoir pressure from port 30 of the application valve to build up in the spring chamber side of the spool-valve-assembly diaphragm and in the timing reservoir. With sufficient differential, air and spring pressure will move the spool-valve assembly to its lower or *Release* position. When the brake-valve handle was moved to *Suppression* position and before the spool valve moved to *Release* position, the suppression valve connected port 3 in the brake valve to exhaust, which also conencts part 33 in the application valve to exhaust. This allows air above the release control valve to flow to atmosphere through the brake valve.

"As the main reservoir air in port 30 of the application valve built up pressure in the spring chamber and timing reservoir, main reservoir air also flowed to the bottom of the release control valve. This moves the valve to its upper position, preventing any connection between the equalizing charging port and pipe 15 and between the equalizing reservoir port and pipe 5, because the spool-valve assembly has moved down to its *Release* position. This is necessary because the operation of the brake-application valve reduces equalizing reservoir air in port 5 to a lower pressure than that of the equalizing charging air in pipe 15 which was lowered by placing the brake-valve handle in *Suppression* position. If this cut-off

(Continued on page 47)



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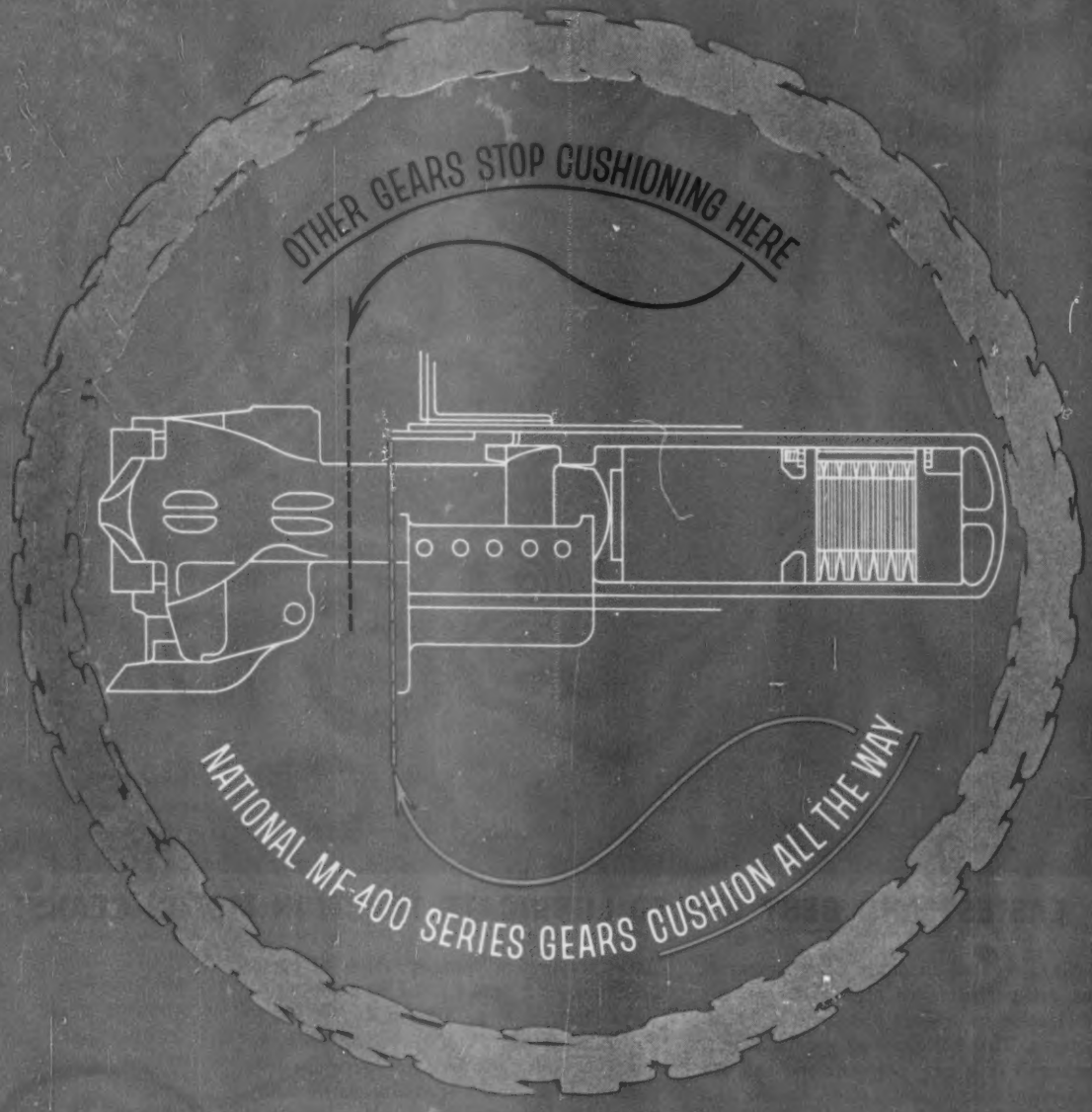

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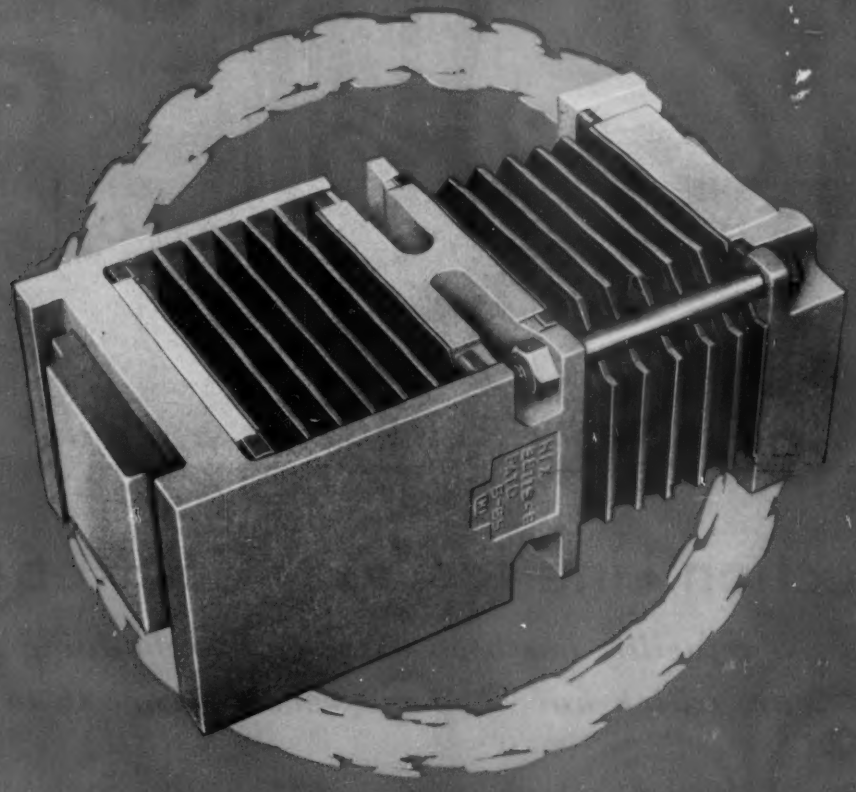

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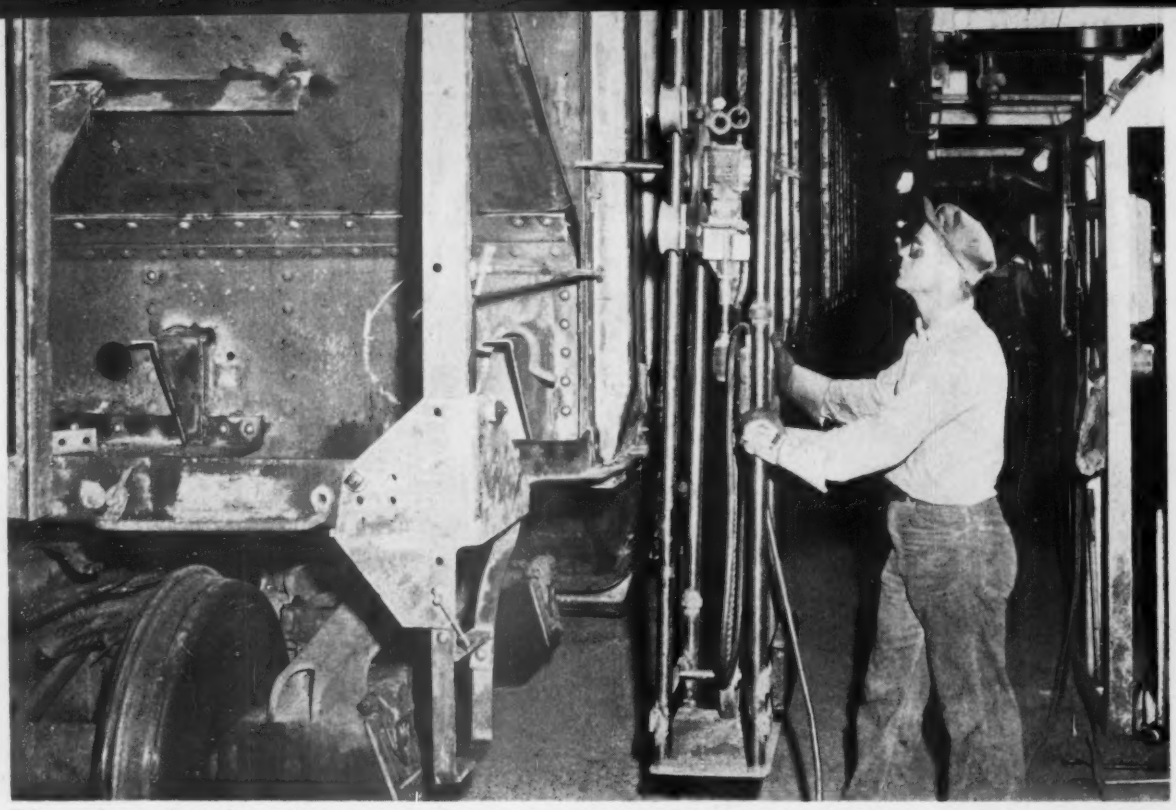

Fixture used on production line positions air motor and reamer so that reaming of holes in car side sheets has been made a one-man operation.

Production Line for L&N Car Repairs

New facility has been assigned to rebuilding of hopper cars which have been in service from 18 to 25 years

Reconditioned cars currently being turned out by L&N car shop have many parts prefabricated by Pullman-Standard. Total of 3,000 cars is involved in the program.

Assembly-line techniques have now been applied to the reconditioning of freight cars at the South Louisville, Ky., shops of the Louisville & Nashville. First assignment for this new 27-position, 2,000-ft production line was the conversion of 738 composite, 50-ton hoppers into modern all-steel cars.

Rebuilding of these hoppers, originally built during 1943, began last March and was completed in June. The line then was assigned to the rebuilding of 3,000 steel, 50-ton hoppers, which went into service from 1937 to 1941. These cars have been coming off the line at a 12-cars-per-day rate.

Operations start at the dismantling yard some distance from the storage yard and car shop. The old car bodies are removed for scrap and are cut into

(*Continued on page* 42)

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Here's important news for piggyback shippers and carriers whose trailers are caught in a clearance squeeze. The all-new Pullman-Standard Lo-Dek Flat Car is designed to ease the squeeze by providing a big extra 10 inches of clearance. With deck height only 31 inches above the rail, the P-S Lo-Dek is 10 inches lower than conventional 85-foot flat cars and several inches lower than *any other* piggyback car on the market. This 10-inch lower profile means that many critical clearance problems can be solved and broader use made of high cube 13′-6″ trailers, letting railroads offer improved piggyback service to their shippers.

The new P-S Lo-Dek is one of the most thoroughly tested cars ever to join the Pullman-Standard line of rolling stock. Over two years have been devoted to developing and testing this remarkable innovation . . . making sure both in laboratory and in service that the Lo-Dek Flat Car meets the demanding requirements of the railroads, their shippers and Pullman-Standard, the world's largest builder of rolling stock.

The resulting Lo-Dek design offers the lowest profile, lowest center of gravity, greatest amount of clearance and lightest weight consistent with safety and stability. Not only lower in profile, the Lo-Dek is also lower in weight and lower in initial cost than other cars designed for piggyback service.

Users are also finding that the P-S Lo-Dek Flat Car is ideally suited for hauling highway auto transports or use with demountable auto racks, adding another dimension to the ways in which railroads can provide better service for their shippers.

LIGHT WEIGHT . . . Constructed of high-strength steel with carefully engineered and tested components, the P-S Lo-Dek Flat Car weighs approximately 52,000 pounds . . . 30% less than conventional 85-foot flat cars.

ECONOMY . . . Low initial cost means original purchase economy, while design and fabrication excellence provide the economies of minimum maintenance. Additionally, light weight construction eliminates approximately 20,000 pounds of unnecessary weight per car. *This means 250 tons less dead weight are hauled in a 25 car consist . . . an important operational economy for the railroads.*

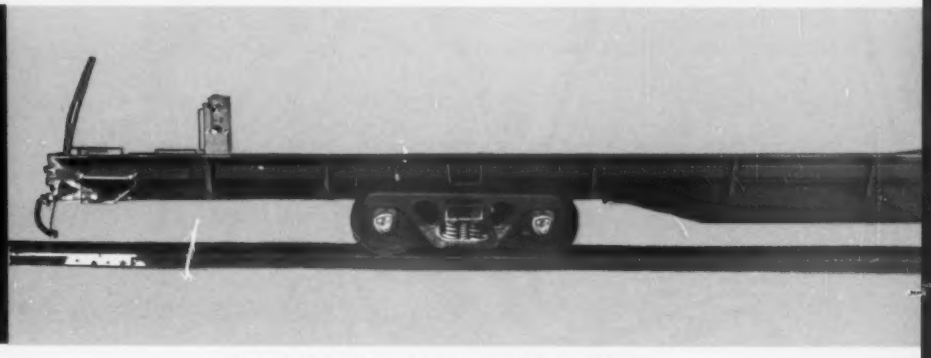
STRENGTH . . . The P-S Lo-Dek is built for strength without excess weight using new unitized construction. Strong, fish belly design center sill, full length floor stringers, all steel deck and combination side sills and rub rails are arc-welded into one unit, providing light overall car weight without sacrificing car strength.

CAPACITY . . . The new P-S Lo-Dek accommodates loads up to approximately 127,000 pounds . . . the low profile permits the hauling of high cube 13'-6" high trailers or fully loaded highway auto carriers in heretofore inaccessible areas. And the 87-foot length of the Lo-Dek accepts two 40-foot trailers with room to spare.

COMPATIBILITY . . . Standard height couplers and slight inclines at each end of the Lo-Dek allow compatible end loading between Lo-Dek and conventional piggyback cars. Presently adaptable to auto racks, future plans for the Lo-Dek Flat Car include provision for container transporting.

car broadens piggyback service

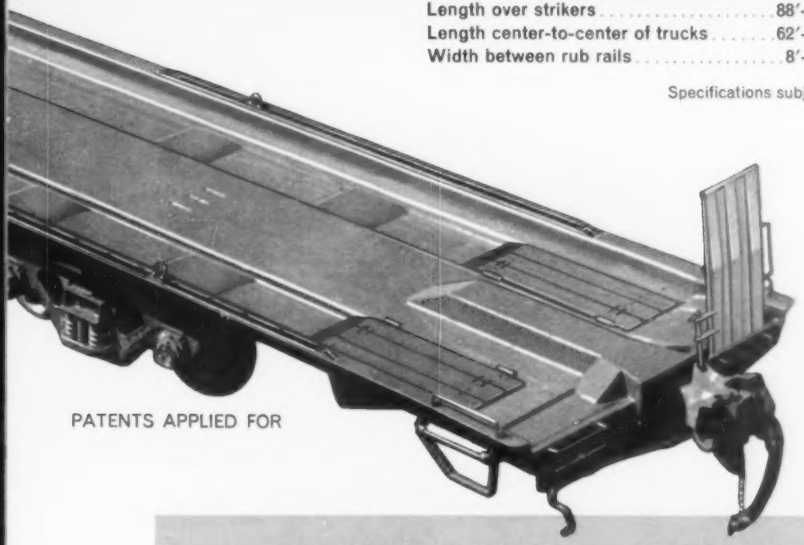
economy...
compatibility



P-S LO-DEK FLAT CAR SPECIFICATIONS

Length over end sills and platform	87'-4"	Height, rail to top of floor (empty)	31½"
Length over strikers	88'-0"	Height, rail to center plate	1'-8¼"
Length center-to-center of trucks	62'-0"	Height of rub rail from floor, maximum	8"
Width between rub rails	8'-2"	Approx. weight (with stanchions)	52,000 lbs.

Specifications subject to change without notice.



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The service-proved and accepted PS-4PB continues to be the standard of the piggyback fleets. Available only from Pullman-Standard, more than 2600 of these standard height (41½" rail to deck top) PS-4PBs are in service or on order. Extensive Pullman-Standard carbuilding facilities continue to assure prompt delivery of this popular 85-foot piggyback flat car.

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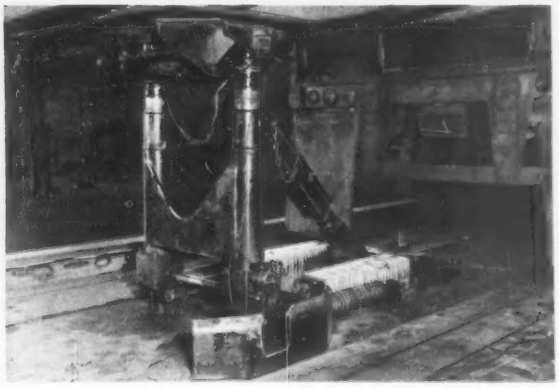
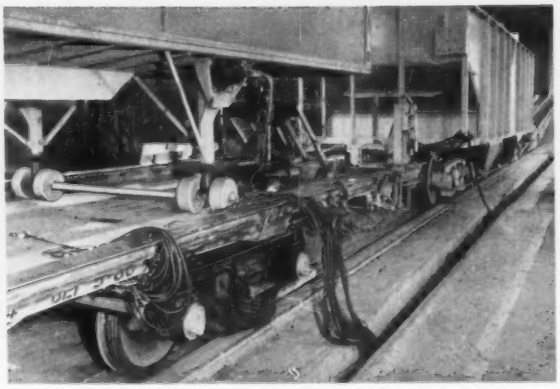
Static tests and rolling load tests measured stresses. Ninety-eight individual impact tests at increasing speeds, up to 10.1 mph, with varying and extreme load heights and weights tested car structure and a specially designed P-S Stanchion. Impact testing of this new P-S Stanchion was so severe that special "billet buggies" were substituted for standard trailers to withstand the collision level impacts absorbed by the Lo-Dek car and stanchion.

Years of bruising service were capsuled into accelerated laboratory testing. Nearly 25,000 test recordings of various speeds, stresses, strengths and other reactions were studied, measured, considered and evaluated. Experienced researchers and engineers put every result through microscopic inspection. Modern electronic equipment was heavily employed to aid mathematical calculations, prove and reprove theories and hasten development. All the forces of Pullman-Standard's Research and Development facilities, the largest in the industry, were brought into play to aid and prove car design. Areas of car inadequacies were quickly and surely corrected.

The end result . . . a new, but proved car design, the P-S Lo-Dek Flat Car, now ready to provide you with new and increased piggyback service and economy.





PATENTS APPLIED FOR

PULLMAN-STANDARD

A DIVISION OF PULLMAN INCORPORATED
200 S. MICHIGAN AVENUE, CHICAGO 4, ILLINOIS
BIRMINGHAM • PITTSBURGH • NEW YORK
J. C. FENNELLY CO., WEST COAST REPRESENTATIVE

15-238

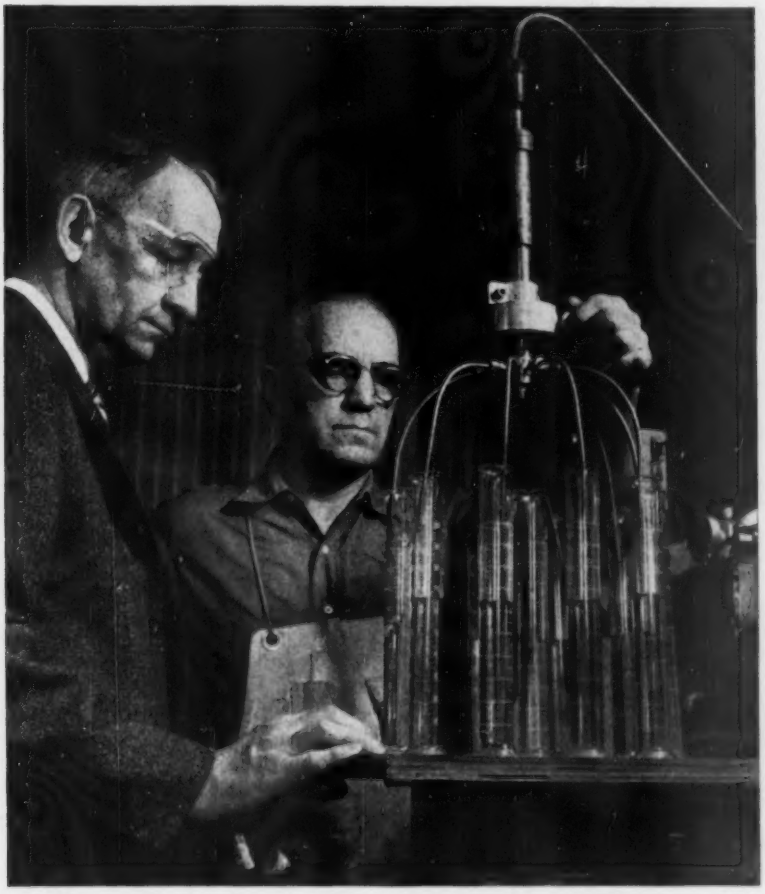
Another important announcement to railroad operating and maintenance officers . . .

Newly developed tester analyzes quantity and pattern of injector nozzle fuel spray!

VITALLY IMPORTANT to proper diesel engine maintenance is reliable analysis of injector nozzle performance. If too little fuel is delivered by a nozzle, combustion in the cylinder served by the nozzle either does not occur or develops less than optimum power. If a nozzle delivers too much fuel, the cylinder is overloaded and incomplete combustion may occur which can result in excessive smoke and fuel washing of cylinder walls with consequent piston ring and cylinder wear and dilution of crankcase lubricating oil.

Now railroads can thoroughly examine an important aspect of injector nozzle performance. The device which permits this is the new Mobil Injector Nozzle Spray Tester.

Sometimes referred to as the "milking machine" or "octopus" because of its appearance, this Mobil Injector Nozzle Spray Tester provides a means to analyze *both* the quantity and distribution of the fuel delivered by an injector nozzle. Thus, it is now possible to obtain valuable information on injector condition in addition to that provided by the necessary "pop," "target" and "flow" tests.



If the nozzle under test is functioning properly, at the completion of the test all graduates contain approximately the same amounts of fuel, with the center graduate practically empty. If any graduate contains more or less fuel than the others, it indicates that the nozzle as a unit may need repair or replacement.

The Mobil Injector Nozzle Spray Tester consists of a metal cup that fits over the nozzle. This cup has holes around its circumference so located that each hole is aligned with an orifice in the nozzle—e.g., a 10-hole nozzle requires a 10-hole cup. Thus there is an outlet corresponding to each nozzle orifice. From each of these outlets, a tube leads to an individual calibrating graduate. A bottom, central drain is also provided and any fuel discharged from this drain is measured as well.

The injector nozzle to be tested is placed on a calibrating stand and the Mobil Injector Nozzle Spray Tester applied. The fuel pump should be a standard, calibrated pump. As the nozzle begins to deliver fuel, the discharge from each orifice is collected in its corresponding graduate. If the injector is dribbling, or if an orifice is delivering a misdirected or too wide a spray, some, or all, of the fuel misses the outlet in the cup and is collected in the center drain graduate. At completion of the test, all orifice graduates should contain approximately equal amounts of fuel with the center drain graduate being practically empty.

The tester shown is for use on injectors operated by separate fuel pumps. A print of the shop drawing is available upon request. A similar tester could readily be designed for use with unit injectors.

This tester is another development in a continuing Mobil program to help railroads utilize fuels and lubricants more effectively. Another example of Mobil Research which goes beyond fuels and lubricants for the benefit of the railroad industry.

Parker B. Smith

RAILROAD DEPARTMENT MANAGER

94 years of helpful association with America's Railroad Industry

Mobil

MOBIL OIL COMPANY, 59 East Van Buren Street, Chicago 5, Ill. • 150 East 42nd Street, New York 17, N.Y. **RAILROAD PRODUCTS**

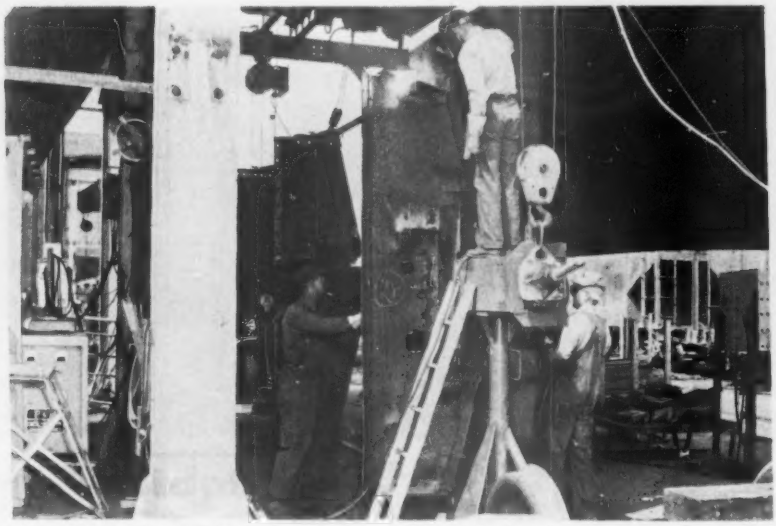
Welding, fitting, and repairing of damaged bolster parts and underframes are completed in series of stations along production line. Shop 14 is at rear.

End floor sheets are fitted, door locks applied, and doors hung. This is one of early stations in Shop 14.

(*Continued from page* 36)

melting-steel sizes. Underframes are then moved to the storage yard for inspection before going on the assembly line. When these underframes are found to require extensive repairs which cannot be made without delaying assembly-line schedule, they are switched to a shop track for such special reconditioning work as may be necessary.

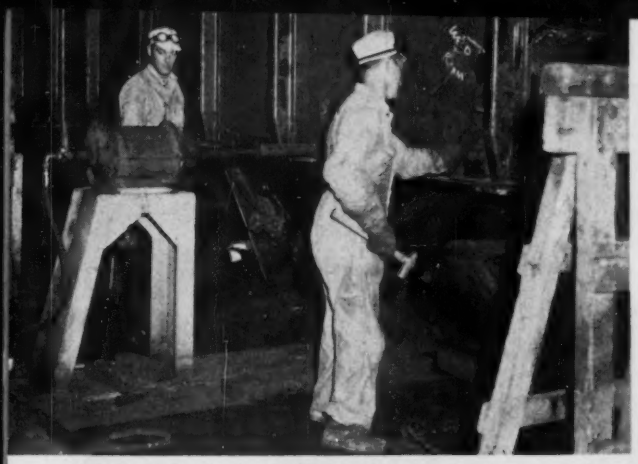
Line operations start with 15 successive outside "spots" along Track 8 and continue through 12 operations under cover in Steel Car Shop 14. When cars leave Position 27, all steel work has been completed. Each hopper then moves through Shop 13 on a line with other cars which have received miscellaneous heavy repairs. Couplers and draft gears are applied. Trucks are repaired at the regular truck-repair pits. The hopper then moves into position for crimping of side sheets and continues in line with other repaired cars for air-brake testing, piston travel adjustment, painting, and stenciling. After the car is weighed and the new light-weight and load-limit stencils are applied, it is billed out for service. Positions on Track 8 in Shops 13 and 14 cover approximately ½ mile. Major work locations are under shelter roofs or inside the shop buildings.



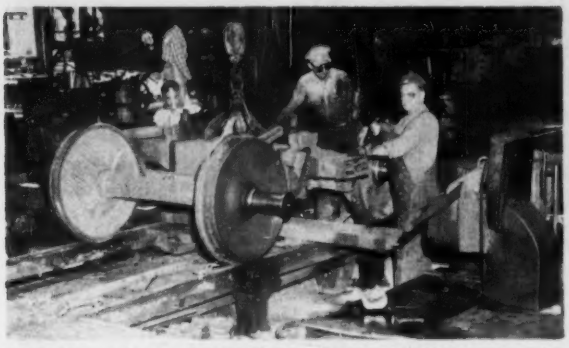
Plug welding of original rivet holes is done in positioner. Center-sill separators are also applied and welded here. Weather protection is provided at several outdoor work stations.

Many of the major body components used for rebuilding these hoppers were supplied by the Birmingham, Ala., plant of Pullman-Standard. These include floor sheets, side and end assemblies, hopper chutes and miscellaneous parts, such as diagonal braces, floor supports, and crossridge braces.

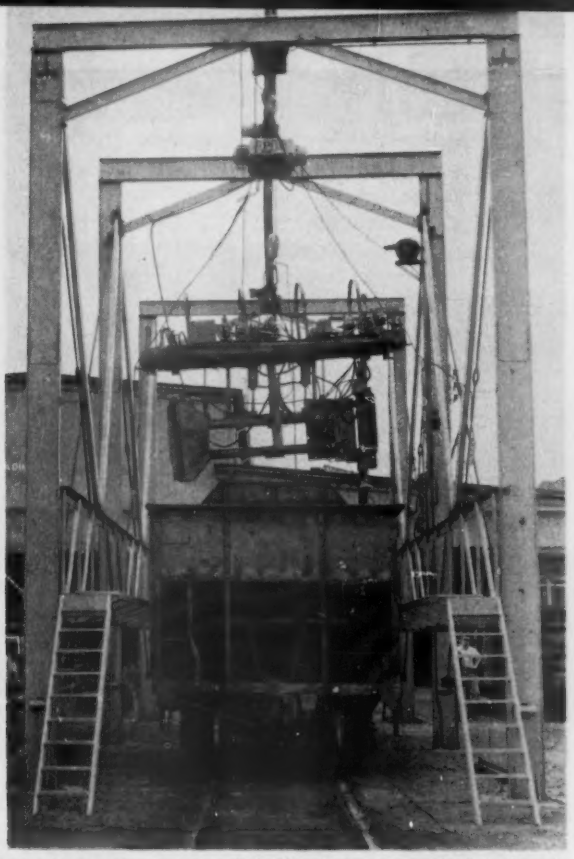
The 50-ton cars now being turned out have a 2,280 cu ft capacity, an outside length over strikers of 34 ft 1 in., a height over sides of 11 ft, a light weight of 41,000 lb, and a load limit of 128,000 lb.



Air jacks hold sides in position in preparation for riveting. Series of special tools have been installed at stations along the line.



Trucks are repaired and assembled in Shop 13. This arrangement for truck repairs has been used by the L&N in previous car programs.



Crimping machine forms vertical ridge ½ in. deep and 36 in. long in each side-sheet panel midway between posts to reduce vibration.

Louisville & Nashville Progressive Repair Line Spot Operations

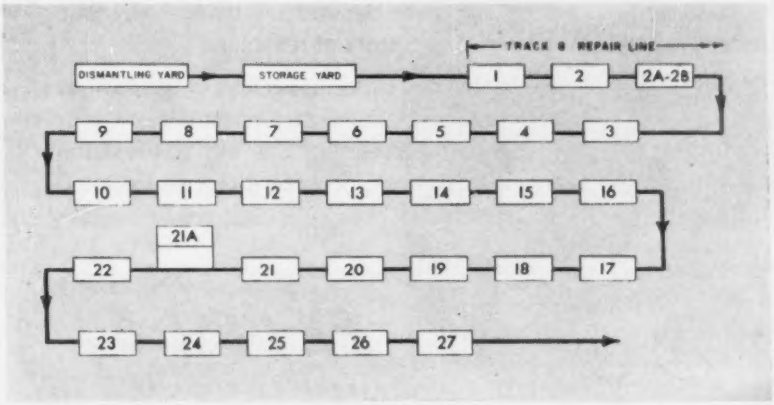
1. Remove journal box packing and blow out journal boxes. Clean and scale underframe.
2. Remove brake equipment.

2A. Remove remaining steel parts including
2B. end sills, end floor supports, cylinder-lever supports and guide, and uncoupling rod casting.

3. Remove coupler and draft gear assemblies. Remove damaged body center plates and damaged side-bearing attachments.
4. Cut body bolsters and crossbearer web sheets to correct width. Remove defective steel parts from underframe.
5. Fit crossbearer and floor support gussets and bottom connection plates to bolster and crossbearer bottom cover plates.
6. Gauge, jig and fit new material to underframe. Replace body center plates and damaged bolster parts.
7. Ream underframe parts.
8. Plug-weld existing longitudinal-hood rivet holes. Fit and weld center-sill separators.
9. Gauge longitudinal-hood rivet guide holes. Grind excess weld metal. Fit and ream end-sill angles, end floor support braces, and hopper supports. Check underframe brake-rod carriers and fulcrum.
10. Drive rivets in bolsters, cross-ridge assemblies and attachments, draft rigging, side bearings and supports and brake rigging gear.
11. Fit hopper chutes and door frames.
12. Fit longitudinal hoods, hopper reinforcing plates and doorframe tie angles.
13. Burn new longitudinal-hood rivet holes.
14. Ream longitudinal-hood rivet holes, hopper chutes and door frames, and doorframe tie angles.
15. Fit and ream door lock fixtures on hopper chutes.
16. Drive rivets in longitudinal hoods, hopper chutes, door frames, door-frame tie angles and door lock fixtures on hopper chutes.
17. Fit and ream intermediate and cross-ridge floor sheets, cross-ridge cap. Hang side braces.
18. Fit end floor sheet. Assemble and hang doors. Apply door lock fixtures and ream all parts.
19. Not used.
20. Fit side assemblies.
21. Fit end assemblies.

21A. (Second shift, off track).—Complete build-up of end assemblies. Apply end ladder grab irons, hand brake, brake step supports, brake step, and bell-crank fulcrum.

22. Fit diagonal braces, corner castings, side ladders, sill steps, brake cylinder support fillers, pipe clamp bodies, end-sill grab irons, angle-cock supports and uncoupling rod brackets.
23. Ream rivet holes in sides and ends and all other rivet holes not previously reamed.
24. Not used.
25. Drive side and end connection rivets and all other rivets not previously driven.
26. Apply AB valve, reservoir, cylinder, all ⅜-in., ¾-in. and 1-in. pipe, release valve rods, brake rigging for body and hand brake.
27. Apply train line, angle cocks, air hose. Complete welding outside of car. Inspect car.



WORKHORSE—This Class M-4 2-8-8-4 locomotive, with more than 280 tons over its 63-inch drivers, had a total engine-tender weight of 1,138,000 pounds. One of 10 locomotives of its type, No. 228 was built for freight service in 1943. **Photo courtesy Duluth, Missabe and Iron Range Railway Company.**

ONE OF A SERIES

Legacy of Reliability

This rail giant shown steaming its way through the night was a symbol of dependability—truly a home-front hero in the 'round-the-clock crisis of World War II.

And in the same race against time, Ex-Cell-O Pins and Bushings were also hard at work, putting a solid measure of precision and reliability into the rolling stock of more than 200 U.S. and Canadian railroads.

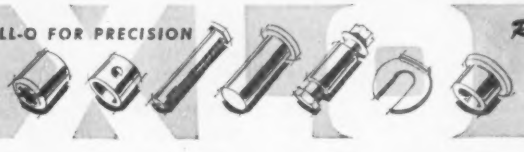
Hardened and precision-ground Ex-Cell-O railroad details continue to keep pace with progress, just as the motive power of America's great railroads has kept pace with peacetime demands for greater efficiency.

Up-to-date heat treatment methods and fast, extremely accurate production machines make today's "diamond hard" Ex-Cell-O Pins and Bushings more dependable than at any time in their long history of reliability.

We invite your close inspection of the savings and service Ex-Cell-O can contribute to your maintenance program. Call our Representative in your area, or write direct to Ex-Cell-O in Detroit.

60-21

EX-CELL-O FOR PRECISION



Railroad Division

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

All-Purpose Reefers for ART

The 60-ton mechanical refrigerator cars recently placed in service by American Refrigerator Transit were built by Pacific Car & Foundry. The 150 cars, turned out at the PC&F plant at Renton, Wash., are all-purpose cars which can provide heating or cooling. Controlled temperature range is from minus 10 to 70 deg. F.

The car is a semi-envelope type. Air circulation is through aluminum ceiling air ducts and plywood side and end wall flues. The blower fans draw air through the cooling coils or heating elements and discharge it into the ceiling duct, from which it passes through the side and end wall flues to the floor and returns under the floor racks. This system gives large capacity, with controlled humidity and regulated uniform temperature.

The cars are designed to meet the demands of today's high-speed freight service. They have a capacity of 3,187 cu ft, with an inside length of 45 ft and an inside width of 8 ft 7 in. The 8-ft plug-type doors are intended to facilitate the use of mechanized materials handling equipment.

Throughout, the cars are of heavy-duty construction, utilizing a combination of welded and riveted components and sub-assemblies. The underframe is assembled around a pair of 51.2-lb AAR Z-section center sills. High-capacity 36-in. draft gears were installed to reduce shock loads and damage in service. This friction gear has an AAR rating of 77,320 ft-lb cushioning capacity at 4.39 in. travel, with 447,000 lb reaction force on the center sill. The trucks are roller-bearing equipped.

The brake system includes an automatic brake-slack adjuster, making unnecessary the manual adjustment of brakes and causing the car to do its full share of braking.

The heavy galvanized steel floor racks will support lift trucks, and their expanded metal slats present a non-slip surface. All interior hardware is galvanized; the subfloor is waterproofed. Side wall flues are plywood and present a smooth surface to the lading.

A 16-gal galvanized-steel drip pan in the B end of the car and a heated drip pan in the A end facilitate draining when top icing is required and pro-

(Continued on page 47)

Light weight of this mechanical refrigerator car is 86,900 lb. Load limit is 123,100 lb.

Partial List of Equipment Suppliers

Ajax-Consolidated Co.
Alco Products, Inc.
American Brake Shoe Co.
American Steel Foundries
Apex Railway Products Co.
Armco Steel Corp.
Bethlehem Steel Co.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Cardwell Westinghouse Co.
Carrier Corp.
Crane Co.
Crucible Steel Co. of America
Davis Brake Beam Co.
du Pont, E. I., de Nemours & Co.
Edgewater Steel Co.
Equipment Specialties Co.
General Steel Castings Corp.
Gustin-Bacon Mfg. Co.
Illinois Railway Equipment Co.
Johns-Manville
Klasing Hand Brake Co.
Liquidometer Corp.
MacLean-Fogg Lock Nut Co.
McConway & Torley Corp.
Manning, Maxwell & Moore, Inc.
National Malleable & Steel Castings Co.
Pittsburgh Plate Glass Co.
Rust-Oleum Corp.
Schaefer Equipment Co.
Scullin Steel Co.
Sherwin-Williams Co.
Silvercote Products Co.
Standard Railway Equipment Mfg. Co.
Standard Steel Works
Stucki, A., Co.
Symington-Gould Co.
Timken Roller Bearing Co.
Trane Co.
Transportation Specialties Co.
Union Spring & Mfg. Co.
Unit Truck Corp.
United States Rubber Co.
United States Steel Corp.
Western Railway Equipment Co.
Westinghouse Air Brake Co.

Interiors have plywood lining, lading anchors, and galvanized floor racks.

✻ AAR CONDITIONALLY APPROVED

✻ HENNESSY LUBE-PAD-13

The Hennessy Lube-Pad-13, now AAR conditionally approved effectively meets the need for a dependable, long life, high quality pad that will constantly provide top lubrication.

Designed to follow the contour of the box, Lube-Pad-13's soft pliable construction affords maximum contact with minimum pressure against the journal. Multiple fold design provides voluminous oil to the journal at all times under all conditions. Neoprene foam core retains from four to five pints of oil in addition to the free oil in the box. Short pile cabled yarn, specially twisted, resists adherence to the journal even in cold weather . . . this feature virtually eliminates pad shifting in the box.

The Hennessy Lube-Pad-13's practical design and rugged construction of heavy duty materials provides exceptionally long pad life retaining original qualities even after several renovations.

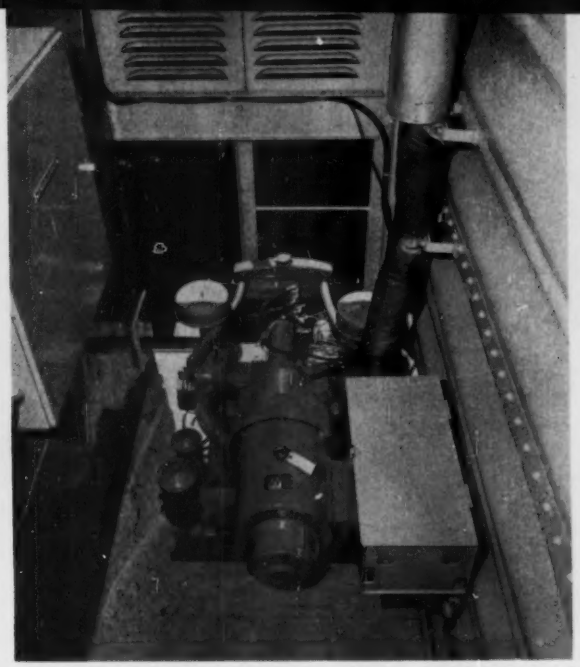
HENNESSY LUBRICATOR

FOR ADDITIONAL INFORMATION WRITE DEPT. H

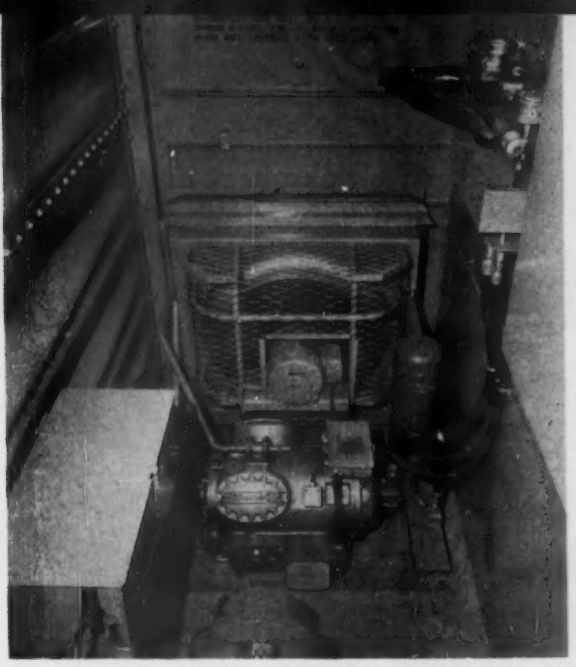
HENNESSY LUBRICATOR CO., INC.

CHAMBERSBURG • PENNSYLVANIA

MAKERS OF LUBRICATORS FOR ALL JOURNALS OF RAILWAY EQUIPMENT



Witte engine-generator set with 12.5 kw rating has been equipped with special muffler for quieter operation. Control panel is at left.



Compressor, condenser, condenser fan, and refrigeration controls form compact group. Battery box is at left against car end.

(Continued from page 45)

vide adequate drainage for defrosting cycles. Each drip pan has two drains. Those in the B end have drain traps which are closed by drain water to keep out dust and foreign air. Perforations in floor rack slats also allow proper drainage when top-icing is used.

Careful construction, with particular attention to installation of insulation and the woodwork, assures a car with minimum heat loss. The refrigeration equipment can cool an empty car from 100 deg F ambient to 0 deg inside temperature in less than four hours. The insulation used is 1½-lb density glass fiber with a K factor of .21. Floor insulation thickness is 8 in.; side and end, 7 in., and roof, 10 in., all with vapor barrier paper. A ⅛-in. sheet steel sub-floor makes this a fully sheathed car, improving insulating conditions.

Refrigeration Equipment

The electro-mechanical refrigeration and heating system is powered by a 12.5-kw diesel engine-generator set. Cooling capacity with minimum performance is 50,000 Btu per hr at 35 deg F inside and 100 deg F outside temperatures. Heating, cooling, and humidity are all controlled. Two-speed engine operation provides 60-cycle current with high-speed engine operation and 40-cycle when the engine operates at its low speed. The generator is of the brushless type with automatic changeover from 60 to 40 cycles as car temperature approaches the thermostat setting. Fuel economy is the principal objective of the two-speed engine control. Fuel capacity is 400 gal.

The engine-room compartment is easily accessible, with ample room inside for inspection and minor servicing without removing equipment from the car. Special louvre design of the engine-room door and compartment side sheets present minimum restriction to air flow through the engine compartment.

A special high-temperature Thermowrap muffler and exhaust deflector have been installed for quieter operation. A standby plug in the power receptacle makes it possible to use 220-volt, 3-phase, 60-cycle standby current.

A's Have It

(Continued from page 32)

were not effective when the spool-valve-assembly moved to its *Release* position, higher pressure air in pipe 15 would flow to the equalizing reservoir pipe 5, slightly increasing pressure in the equalizing reservoir and in the equalizing reservoir chamber of the brake valve. The relay valve portion of the brake valve would be actuated, allowing a slight increase in brake-pipe pressure, thereby releasing, or partially releasing the brakes.

"When the brake-valve handle is returned to *Running* position, air from the bottom of the release control valve and port 8 of the brake-application valve is connected to atmosphere through port 8 and the suppression valve of the brake valve. Main reservoir air flows through the suppression valve of the brake valve to port 3 of the brake valve, then to port 33 of the P-2A brake-application valve and to the top of the release control valve. This will move the release control valve to its upper position, thereby connecting equalizing reservoir charging air in pipe 15 to the equalizing reservoir air through port 5; the equalizing reservoir charging air in pipe 15 is now able to flow to, and charge, the equalizing reservoir and so position the Relay Valve in the brake valve to allow charging of the brake pipe and insure a positive release of the brakes.

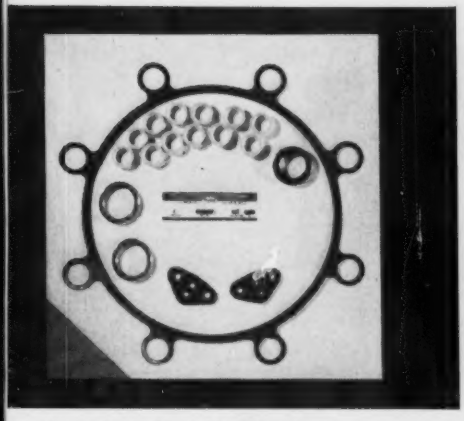
"That shows you why the P-2A application valve can give more satisfactory operation than the P-2," George observed. "I think that now you probably can see why the brakes on that passenger train released. I think we've taken care of the safety control and the overspeed control. There are some additional brake functions which involve this P-2A application Valve."

(To be continued)

HOW'S THIS

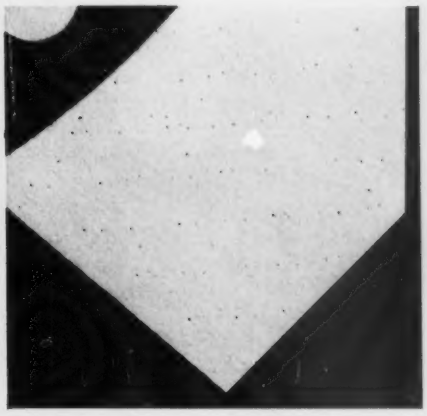
FOR PROTECTIVE PACKAGING?

See the benefits of Electro-Motive's exclusive skin packaging of replacement parts.



Immediate visual identification

No need to open boxes, spill contents. Set of replacement gaskets shown here can be positively identified without being opened.

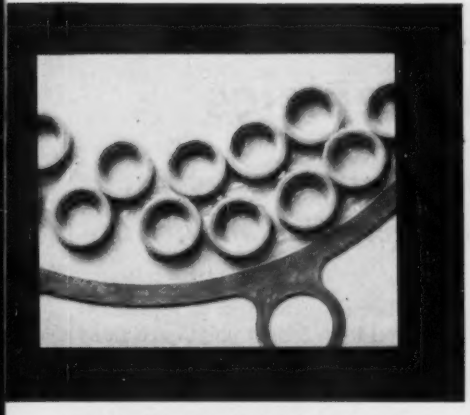


Positive seal keeps contents fresh

Tiny holes in the special backing material permit all air to be withdrawn from package. Holes are closed when vacuum is released, forming a tight seal. Gaskets retain natural moisture—won't dry out or shrink even when stored for a year or more.

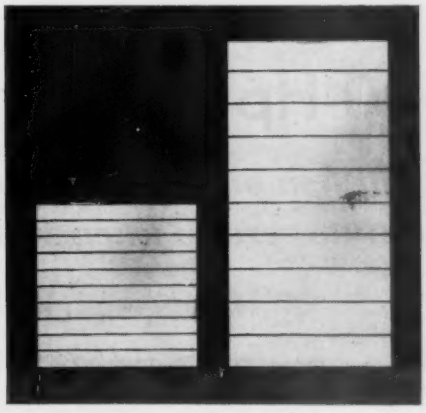
Moisture, vapor can't get in

The same protection that keeps natural moisture in keeps undesirable moisture—as well as dust and dirt—out. Dampness, high humidity or accidental soaking cannot damage the contents.



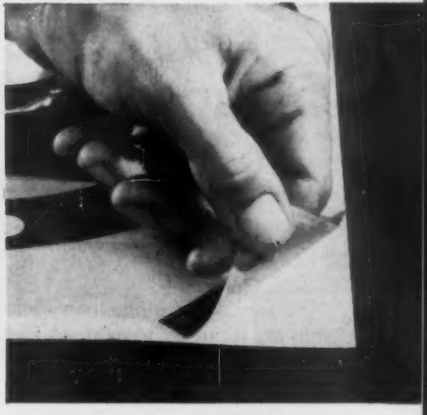
Parts held firmly, protected from damage

Close-up view above shows how skin-tight packaging holds each part firmly in place. There is no chance for loose parts to rattle around and become damaged or misshapen during shipment and normal handling.



Reduces storage cube requirements

The skin-tight packaging reduces all parts to minimum cube. No extra, unnecessary carton bulk to rob you of costly storage space. Forty sets of skin packaged gaskets will fit in the same cube normally required by twenty.



Easier to open than a pack of cigarettes

To open the skin-packaged parts, simply grasp the tab at the corner where skin does not adhere to backing material. Pull the skin away from the backing material. The parts are ready for instant use.

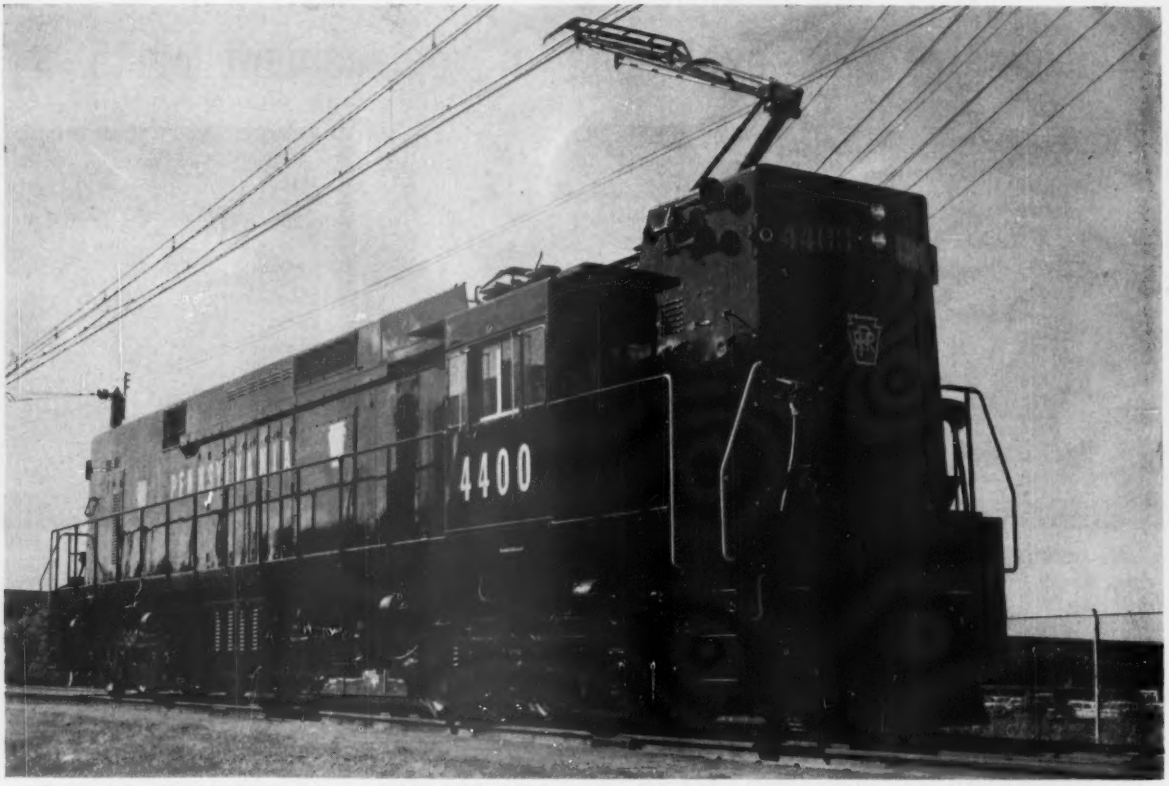
GEARED TO PROGRESS
P R I

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS *Home of the Diesel Locomotive*

Canada: General Motors Diesel Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



Road switchers, PRR Class E-44, will replace the 3,750-hp 2-C-2 electrics which the Pennsy put into service when main line was electrified.

Pennsy 4,400-Hp Ignitron Electrics

$32-million order will replace locomotives which went into service when PRR electrified main line

"We are taking a long, confident look into the future as we acquire these locomotives," Pennsy President Allen J. Greenough said recently as the first of 66 ignitron rectifier locomotives was delivered to the PRR in Philadelphia from General Electric's Erie, Pa., plant.

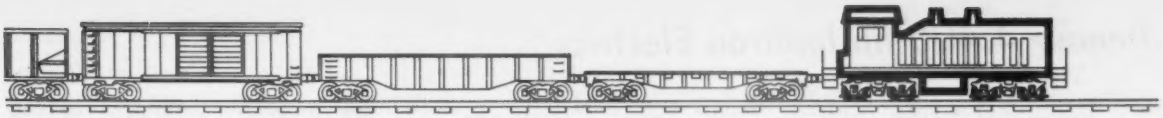
This $32,000,000 order is the largest placed for electric locomotives by a U. S. railroad since the 1930's. "These units," Mr. Greenough added, "will serve for many years to increase the capacity of our electrified lines, improve service to shippers, and strengthen our reserve potential in the unhappy event of a national emergency.

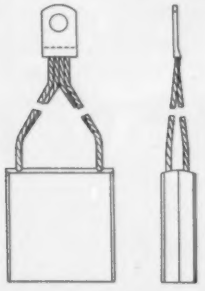
"An electrified railroad is the most efficient means of transportation over land where there is sufficient volume to warrant the investment, as in our New York-Philadelphia-Washington-Harrisburg lines," Mr. Greenough concluded.

The 195-ton, 4,400-hp PRR Class E-44 locomotive has a road-switcher type body with two six-wheel trucks. Continuous tractive effort is 55,500 lb and maximum speed is 70 mph.

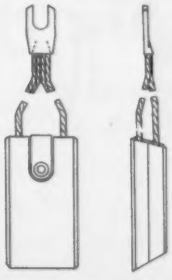
The PRR is acquiring the 66 units under a lease arrangement with General Electric. They are to replace 90 P-5 and P-5a freight units, each rated at 3,750 hp, which were placed in service as the Pennsylvania electrified its New York-Washington and Philadelphia-Harrisburg, Pa., routes in the early 1930's. The PRR expects a sharp reduction in maintenance costs when the 66 new E-44 units have replaced the "outmoded" P-5 and P-5a locomotives. PRR also operates 139 streamlined GG-1 freight-and-passenger electrics and 10 other freight electrics.

About ten years ago the PRR began to study the possibility of using

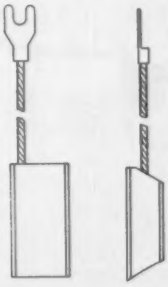




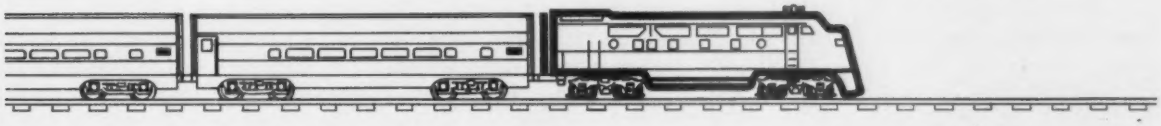
Speer Brush No. 3488-E46
For EMD, MOT—D7, D17, D27, D37, 716E2, 721 721A2

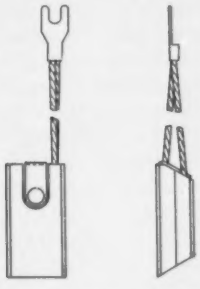


Speer Brush No. 3684-E44
For EMD, GEN.—D12, D15

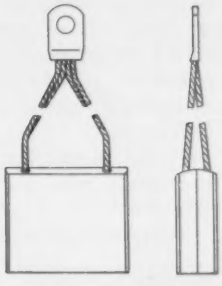


Speer Brush No. 4216-E35
For EMD, AUX GEN — A3001 A7159
BLOWERS—A7158, A7160, A8101

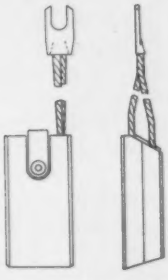




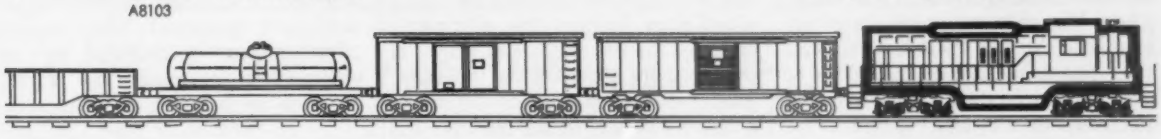
Speer Brush No. 4692-E35
For EMD, AUX GEN — A3001, A7159, A8102
BLOWERS—A7158, A7160, A8101, A8103



Speer Brush No. 3602-E34
For GE, MOT—726 730, 752



Speer Brush No. 3717-E24-E44
For GE, GEN — GT564B1, C1; GT566C1, D1; GT567; GT569; GT576; GT581A1; GT586; GT571



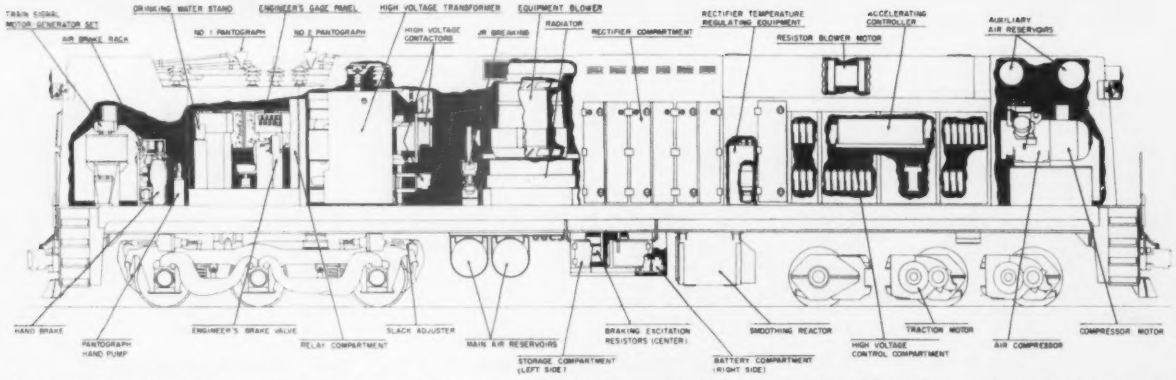
DON'T HAVE A BRUSH WITH TROUBLE . . . SPECIFY SPEER!

FOR TRACTION MOTORS . . . GENERATORS . . . AUXILIARY GENERATORS . . . BLOWERS

It pays to replace with a genuine SPEER Brush! With Speer brushes for every type diesel-electric locomotive, you're assured of even wear, reduced vibration, improved commutation, longer service life. How do we know? Millions of Speer railroad brushes have proved it Whatever the brush application, there's a Speer Brush that's "just a little better." Write for all the facts...and prices. Send today for your free copy of the informative booklet, BRUSHES FOR ELECTRICAL ROTATING MACHINERY!

SPEER Carbon Co.
St. Marys, Pa.

Pennsy 4,400-hp Ignitron Electrics



E-44 is 15 ft over lowered pantagraph. Truck center distance is 45 ft. Arrangement is similar to that of Norfolk & Western (former Virginian) units.

direct-current traction motors on locomotives operating under its 11,000-volt, 25-cycle, alternating current catenary system. Its P-5, P-5a, and GG-1 locomotives all have a-c traction motors. In 1949, a PRR m-u car was equipped with mercury-arc ("ignitron") rectifiers and d-c motors. In 1951, two experimental road freight units with rectifiers and d-c traction motors were placed in service. Six PRR Pioneer III multiple-unit cars are similarly powered (RL&C, August 1958, p 21).

The New Haven operates 10 rectifier-type passenger locomotives and 100 rectifier-equipped m-u cars on its New York to New Haven electrified territory. Twelve 3,300-hp road switchers for freight service were placed in service on the Virginian (now Norfolk & Western) in 1956. These Virginian locomotives are very similar to the new PRR E-44's. Rectifier locomotives have proved to be very popular on the rapidly expanding electrified lines in other nations.

The new road switcher is 69 ft 6 in. over coupler pulling faces. The cab is located over the lead truck with the short hood nominally rated as the front of the unit, although the cap is fitted with two complete sets of controls, simplifying operation in either direction. Locomotive controls are arranged for operation of up to four units in multiple. All units are fitted with standard 26-L air brakes and dynamic braking equipment. During dynamic braking, the motoring resistors serve as braking resistors. They are forced-air cooled with the air volume varied in relation to the braking load.

Equipment Hood

The equipment hood extends from the cab to the rear end of the locomotive. The forced Pyranol air-cooled transformer, located next to the cab, occupies the full width and height of this section. Included on the transformer are the tap switches that supply a variable voltage to the rectifiers and traction motors, a Pyranol pump to circulate the transformer coolant, and other switch gear necessary for the circuit operation. The 11,000-volt high-voltage bushing extends from the top of the transformer through the roof so that the 11,000-volt circuit is confined to the roof. Canopies extend over the outside walkways underneath the pantograph area to protect personnel from contact with the high voltage.

Power at 11,000 volts, 25 cycles is fed directly to the transformer. The secondary tap switches located on the transformer tank supply a variable voltage to the 12 ignitron rectifier tubes connected three in a group in a bridge connection. The rectifier power flows through a smoothing reactor to the six GE-752 traction motors, one on each axle. These motors are permanently connected two in series, three pairs in parallel. Speed-tractive effort control is provided by tap changing on the transformer secondary, and by using resistors in series

(Continued on page 58)

Power truck is similar to that used on GE diesel electrics. There are three GE 752 motors, one on each axle. Wheel base is 13 ft. Trucks have drop equalizers, 40-in. wheels, and roller bearings.

Group of six rectifiers is placed on each side of hood. Each set of three is connected in a bridge connection. From rectifiers, current flows to smoothing reactor and motors.

R B&W high strength bolts...

116th year

NOW...REBUILD CARS FASTER

...and far stronger, too

A BETTER WAY TO REPAIR as well as to construct cars has been pioneered by RB&W. Installing high strength bolts instead of rivets makes these money-saving differences:

(1) They make the joints *permanently tight.* (2) They enable the connections to stand up under vibration and impact that too often cause rivets to loosen or shear. (3) They need no special skills to be installed quickly, properly, and with minimum inspection . . . at any shop or repair track.

And yet with all these advantages, installed cost of a bolt comes to less than that of a rivet!

Typical problem jobs have clearly demonstrated these advantages of RB&W High Strength Bolts.

- 2300 gondola cars had their center sills clamped tight with high strength bolts . . . thereby sharply decreasing need for maintenance required previously because of rivet failure.
- Draft gear castings of 70 ton freight cars were fortified against heavy impacts when high strength bolts replaced rivets which tended to shear.
- Ballast cars in deferred maintenance were restored to service faster without the extra operations and skilled crews required by riveting.

Learn more about how RB&W High Strength Bolts improve cars and save on costs. An RB&W engineer will be happy to discuss this superior fastening method with you. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

On Newest Transit Cars . . .

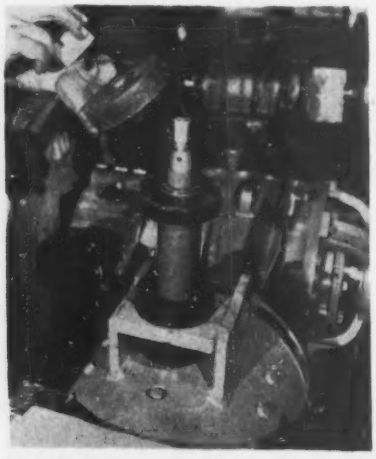
Flexible Mounts Control Vibration

Light weight accentuated problems of vibration, shock, and noise in the design of the 270 transit cars which Budd is currently building for Philadelphia (RL&C, July 1960, p 38). Such disturbances could have become perceptible, and damaging, when structural weight was decreased. The stainless-steel Budd car weighs 26 tons, 6,000 lb less than a similar carbon-steel car. Effective isolation of the disturbances was required to protect components and prevent excessive maintenance, while insuring a smooth, quiet ride. Budd engineers worked with specialists from Lord Manufacturing Co. to incorporate flexible suspension systems, consisting of bonded rubber mountings, throughout the stainless car. Lord supplies all types of vibration isolators.

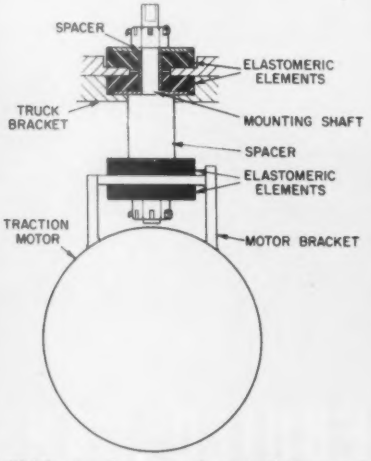
Such elastomeric suspension systems cushion the supported equipment from external disturbances and isolate the rest of the car and passengers from vibration and noise generated by the supported equipment. Flexible suspensions on the Budd cars lower installation and maintenance costs, allow use of lighter components, and increase the passenger's comfort.

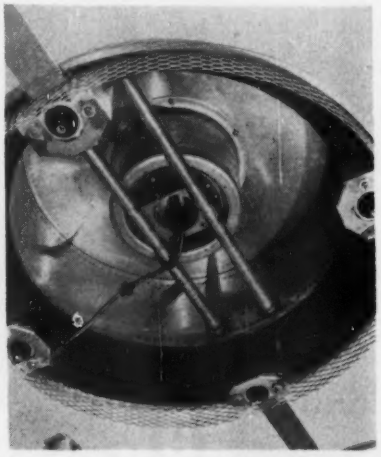
The car is powered by four 100-hp traction motors, each of which is directly connected to a right-angle, hypoid-gear axle drive unit. Sudden torque impulses and wheel-rail shocks are isolated in the trucks by a motor mounting system consisting of a vertical shaft and four elastomeric flexing elements. The vertical shaft passes through brackets, both on the motor and truck, which are sandwiched between pairs of the flexible elements. The mountings also offer positive re-

(*Continued on page* 58)

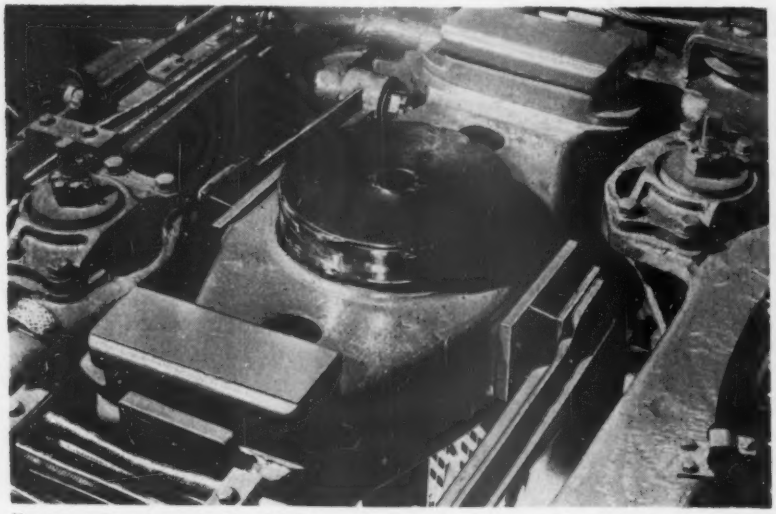


Elastometric mounting on hanger which supports 100-hp traction motor from truck transom is intended to isolate, in truck, torque impulses and shocks resulting from rail irregularities.

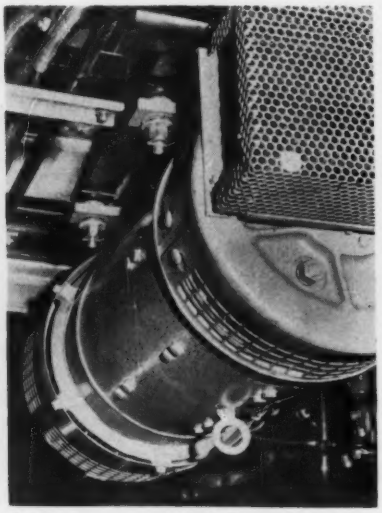




Flexible mountings in car ceiling contain vibrations set up within lightweight fan units.



Shear mountings on each side of bolster act to produce necessary restoring force to align truck with body after car comes out of curve. Air-suspended bolster requires these units.



Motor generator set supplying control current is isolated by elastometric hanger mounts.

Vol. 3, No. 2

Railway Executive News

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111 New South Road • Hicksville, Long Island, New York

"L & N LOOKS AHEAD at Railroad Communications and Signaling"

Timely article† by Supt. of Communications and Signals, P. P. Ash of the Louisville and Nashville Railroad, describes the L&N's integration of latest advances to meet present-day requirements of railroad signaling and communications. Author Ash details a long, impressive series of L&N advances.

"One of the most serious problems the railroads have to contend with," writes Ash, "and one in which the answer appears to lie in the field of electronics, is the problem of freight car hot boxes. Numerous wrecks and derailments caused by burned-off journals have resulted in millions of dollars loss both in damage to equipment and lading.

"On the L&N, to accomplish the desired results we use electronic equipment consisting principally of a sensitive instrument to detect infrared heat rays. Developed by the Servo Corporation of America, this delicate instrument reacts to the infrared rays radiated from the journal boxes as they pass the device."

The Louisville and Nashville Railroad is one of twenty-eight Class I American railroads using SERVOSAFE® Hot Box Detective* systems to guard against derailments, damage, and delays. More than 200 SERVOSAFE Hot Box Detective systems are in successful operation across the country to date. ■

†*L&N Looks Ahead at Railroad Communications and Signaling*, by Philip P. Ash, Supt., Communications and Signals, Louisville and Nashville Railroad — RAILWAY MATERIALS and EQUIPMENT, July-August, 1960.

*Protected by U.S. & Foreign Patents, including U.S. Patents No. 2,880,309 and No. 2,947,857. Other U.S. & Foreign Patents Applied For.

Operator watching SERVOGRAPH® hot box detector recorder at L&N's big Boyles Yard, Birmingham, Alabama. L&N has a number of SERVOSAFE® Hot Box Detective* systems in operation at various locations.

C&EI Makes 28th Road To Go SERVOSAFE®

Main Line Scanners Are Bi-Directional

Twenty-eighth railroad to join the fold of SERVOSAFE® Hot Box Detective* users, the Chicago & Eastern Illinois has ordered five basic systems to guard C&EI rights of way.

Already in successful operation, two of the systems installed on the main line at Glover, Ill., and Cayuga, Ind., employ a single set of bi-directional infrared trackside scanners. Here in this single-track area the same pair of scanners inspects the journal boxes of trains going in either direction.

The scanners are installed in the conventional manner just outside the rail, their sensitive infrared eyes focused to view the trailing side of the journal boxes passing in one direction. Trains passing in the opposite direction switch transducer sequence so that the scanners look at the leading side of the boxes.

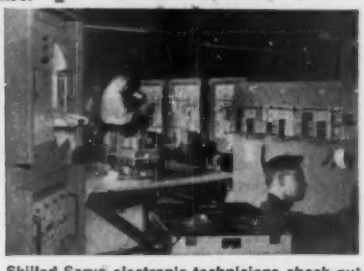
Bi-directional scanner operation is optional with the basic SERVOSAFE system or any of the five other SERVOSAFE expanded system groupings. ■

Coming or going, trains have journal boxes inspected by same pair of bi-directional trackside scanners.

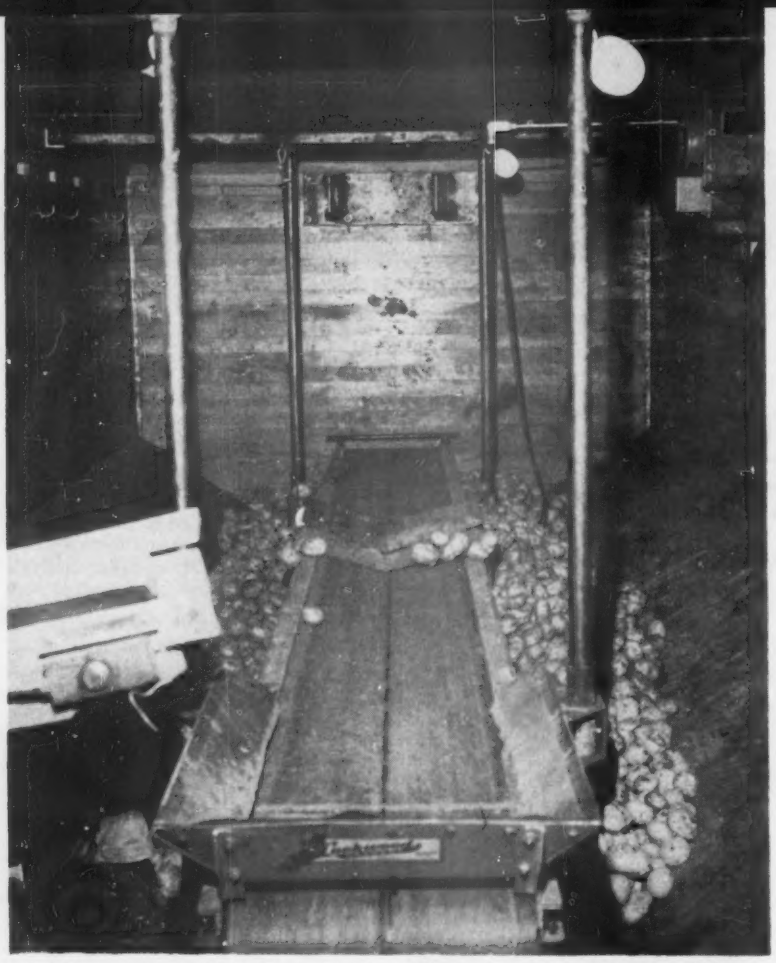
Detective Demand, Rapid Delivery Met by Modern Production Methods

Skilled Servo electronic technicians man their stations as SERVOSAFE Hot Box Detective systems highball through production. Full-scale production keeps pace with Detective demand and assures immediate delivery.—■—Engineering, production, testing, quality control, inspection, and shipping all work as a team under one roof in Servo's spacious modern 134,000 square-foot Hicksville, Long Island, plant. Electronics specialists to the railroads, they are "serving safety through science." ■

Resembling batteries of mortars, long lines of infrared bolometers for SERVOSAFE trackside scanner units receive thorough inspection and testing before they are assembled inside their protective housings.



Skilled Servo electronic technicians check out modular components of rest of SERVOSAFE Hot Box Detective system — data processing unit, recorder, carrier, hot box locator, etc. — before and after final assembly of the equipment.



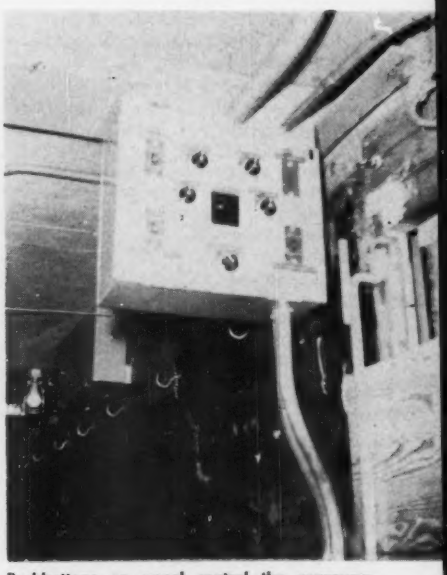
Warehouse conveyor (left) is in position for loading and plow for distributing potatoes.

BAR Mechanizes Potato Handling

The Bangor & Aroostook car for automatic loading and unloading of potatoes and other produce (Railway Locomotives and Cars July 1960, p 54) is another example of the trend toward automation. It employs five mtor-driven conveyors, two motor-driven hoists and two motor-operated plows or spreaders for distributing the potatoes evenly in the car. Except for the warehouse conveyor which delivers the potatoes through the side door of the car and the need for 110-220 volt, three-wire, single-phase power to operate the motors, the car needs no facilities for loading and unloading.

Two conveyors are used for loading. Each one is 20 ft long and serves half the car. These conveyors are normally carried in a horizontal position close to the ceiling of the car. These are suspended by cables and, for loading, are lowered to the floor of the car by a hoist motor which drives the cables. The incoming potatoes are poured onto the end of the conveyor near the door and transferred toward the end of the car on the belt. A plow mounted on the conveyor frame pushes the potatoes over the sides of the conveyor. The plow may be moved to any desired position on the conveyor by means of a ¼-hp motor. As the car is being filled, the conveyor is raised by the hoist motor

Motor drive for transverse conveyor is in place under permanent slope board at doorway.



Pushbuttons on panel control the conveyors.

and the plow is positioned to load the car evenly.

Three conveyors are used for unloading. Two of these employ 24-in. rubber covered draper chains and are placed longitudinally in each half of the car. They are recessed into the floor between the sloping sides of the car. There is also a reversible cross conveyor at the center of the car. This is used to move the potatoes out of either side door.

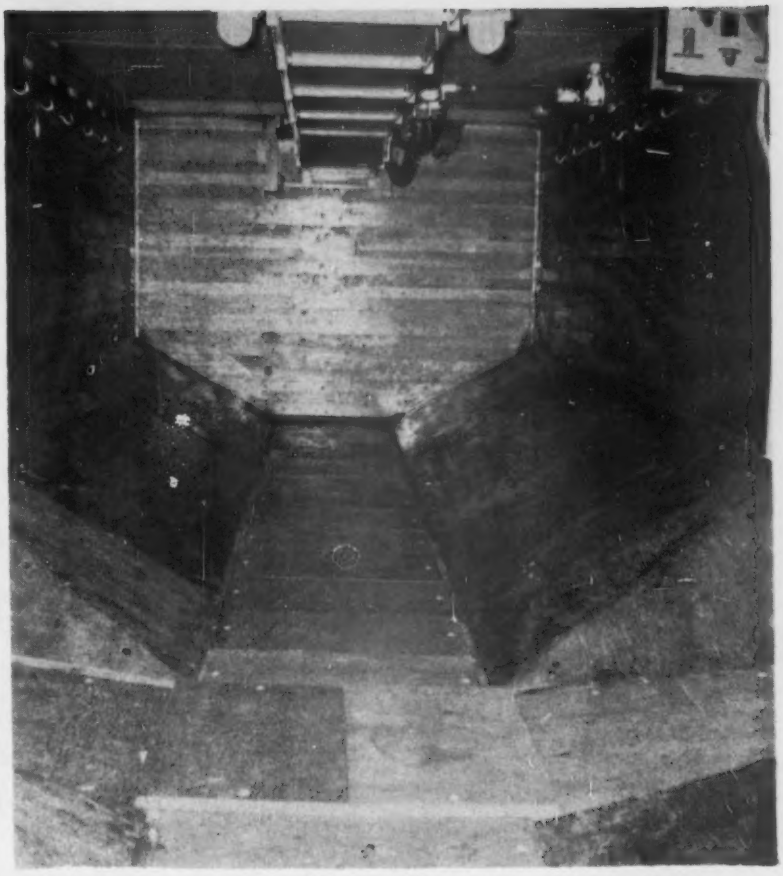
Loading Preparations

Before the car is loaded, the horizontal unloading conveyors are covered by pick-out boards and the doorway not being used is covered by a false bulkhead with its smooth surface facing in. The door through which the produce is received has a bottom panel with three hinged doors and three narrow panels at the top. These are placed in turn as the load rises. Drop pins hold the panels in place.

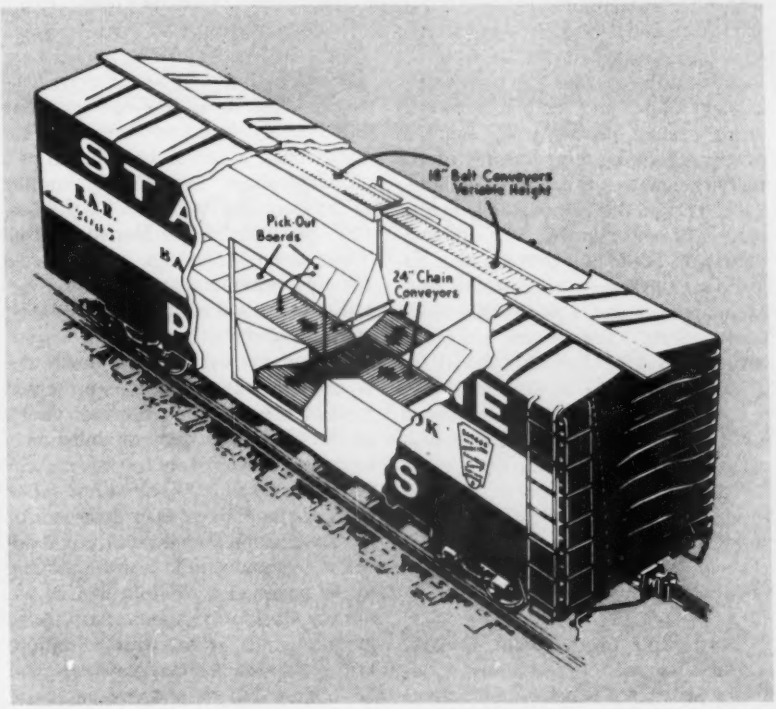
During the unloading operation, the pick-out boards over the floor conveyors are removed one by one and hung on hooks inside the car near the roof. The floor conveyors then move the load to the cross conveyor which in turn moves it out of the car.

A ¾-hp, 110/220-volt single-phase reversible back-geared motor is used to drive each of the five conveyors and the two hoist motors. The ¼-hp plow motors are also back-geared and reversible. The loading conveyor output shaft rotates at 129 rpm and drives the belts through roller chains at 140 ft per min. The unloading conveyor motors have an output shaft speed of 86 rpm and drive the draper chains at 75 ft per min. The speed of the cross conveyor is also 75 ft per min.

The control panel for all equipment is located at the doorway on the inside car wall next to the ceiling. Loading operations are controlled by the four upper switches and unloading by the three at the bottom. There is an on-and-off switch and circuit breaker at the center with plow-positioning switches at either side. All wiring consists of No. 10 rubber covered wire in rigid metal conduit. Power is received by three wire receptacles mounted under the car at either side. The car is insulated and safe produce temperatures are maintained in cold weather by a charcoal heater mounted under the car.



Loading conveyor is lifted to ceiling, and pickout boards cover the unloading conveyor.



Conveyorized loading and unloading has proved popular with Bangor & Aroostook customers.

Pennsy 4,400-hp Ignitron Electrics

(*Continued from page* 52)

with the motor armatures.

The auxiliaries, such as the motor-generator set, air compressor motor, and equipment blower motor, operate from a 196-volt tap on the transformer secondary. All of these are single-phase induction motors, thus eliminating commutator and brush maintenance.

Circuit Breaker

Adjacent to the transformer switch gear is a high-speed, air circuit breaker to limit the current on arc back. Protection is also provided for short circuit and ground faults occurring in the transformer and traction-motor circuits. The auxiliaries have their own individual overload protection.

Twelve main-circuit, power-rectifier tubes, with their firing circuit apparatus are located next to the hood doors at this section. This makes possible easy inspection and maintenance of the rectifier tubes and circuits. Four iron-core current balancing reactors are located between the rectifier cubicles, while the main smoothing reactor is located underneath the platform below the rectifier section. This minimizes the undesirable magnetic effects of the reactor and lowers the locomotive's center of gravity.

Also in the rectifier compartment is a water pump and temperature-regulating system necessary to maintain proper operating temperatures of the rectifier tubes. A three-way regulating valve insures that the water temperature is closely controlled at approximately 43-50 deg C, with the heat being dissipated by a water-to-air heat exchanger in the equipment blower compartment. The blower is a large, two-stage radial type that draws air in from both sides of the locomotive just under the roof and directs it downward through the rectifier heat exchanger and into an air duct in the cab underframe. From here, it is distributed to the transformer, reactors, and traction motors.

Control Equipment

Most control equipment is contained in two sections, separated by an inside aisle and located just behind the rectifier section. Controls are accessible either from the inside or outside of the locomotive, simplifying inspection and maintenance.

The structure of the control and rectifier compartments provides support for the resistor compartments on the roof. This arrangement allows the length of the inter-connecting leads and bus bars to be kept to a minimum. It also keeps the heat dissipated from the resistors away from the control equipment.

The nose of the long end equipment hood houses the air compressor, governor, and control air reservoir. This compartment is also accessible from either side and from the nose. Compressor is a Westinghouse Air Brake two-stage, motor-driven model, with a rating of 224 cfm and 140 psi at 725 rpm. It is equipped with suction unloading valves so that the compressor may be operated continuously, important when single-phase, induction type motors are used.

The locomotive control system is designed for 65 volts and can be operated from the battery for a period of time. Battery and air reservoirs are underneath the platform. The battery has a 155 amp-hr rating. Placing the batteries outside of the equipment hoods is desirable from the standpoint of maintenance and ventilation.

Atop the cab roof are two pantagraphs of a type not previously used in this country. Only one is required for operation; the other is available as a spare. They are of a radical new design. Instead of the familiar diamond shape, they resemble a human arm with a "hand" sliding along the power wire and the "elbow" steadying it.

The 90 P-5 and P-5a locomotives will be completely replaced by the 66 E44 locomotives when delivery of the latter is completed by mid-1963. Operating experience with similar rectifier type locomotives on the former Virginian Railway indicates that the PRR will effect substantial savings in maintenance expense by this change.

Flexible Mounts Control Vibration

(*Continued from page* 54)

bound and bottoming protection for the 600-volt, d-c motors.

Along with this flexible motor mounting there is also another application of elastometric elements in the trucks. With the air suspension in the combination of air and springs, there is no return force to "bring the car back" from a curve. Installation of a standard shear "sandwich" mounting at the front and rear of each truck bolster produces a cushioned lateral. There shear mountings were selected for this non-metallic connection between truck and body because of their strength and "returnability."

Within the carbody the newly designed automatic ventilators presented a problem in isolating vibration. Each of the four 23-in. fans mounted in a separate "blister" on top of the car can move up to 3,000 cfm of air. The units are the lightest ever designed for transit cars, but fan vibration could develop structure-borne noise annoying to the passengers. Within the fan assembly are four one-piece elastomeric mountings to isolate this vibration. Wider manufacturing tolerances and faster installations and overhauls are possible as a result of the flexibility of the elastomeric element and the tapped steel inner member of this mounting.

Beneath the carbody are two components which could be sources of vibration. Four stable mountings, loaded in compression, secure a 3-kw motor generator to the underframe. Low-voltage, d-c power for the controls, battery charging, doors, fans, and lights is supplied by this m-g set. Its mountings isolate any high-frequency vibrations of the armature and protect the unit from shocks developed during normal car operation. A 1,200-lb motor-driven air compressor is mounted under the car with four axially soft mountings. Low frequency, out-of-phase disturbances are characteristic of this type of compressor which operates between 630 and 855 rpm. Radial flexibility of the mountings cushions fore and aft movement of the compressor, materially reducing the stresses in the mounting frame. At the same time, low-frequency, high-amplitude vibrations are kept out of the car. According to project engineers, if these disturbances were not isolated, they would be intolerable to passengers on the seats directly above the compressor.

"Jim, I frankly don't know," replied Pete. "It's one of those things; it shouldn't happen but did. It comes out the way it was put in."

Gone But Not Forgotten

By Ken Wright

In the small hours of the morning the telephone jangled noisily. Big Jim rolled over in his bed and tried to ignore the sound. The bell rang again. Groaning, he groped for the light by the bed and finally succeeded in reaching it after nearly knocking it to the floor. By the time Jim finally answered his phone, his mood was about the same as that which his grumbling employee, Pete, usually brought to work.

The caller was one of the night men at the shop. Another mechanical refrigerator car was in trouble. Everything had been checked and still the car's temperature was rising. They would either have to transfer the load or apply dry ice to the car.

"You know that dry ice is a dirty name for us," growled Big Jim. "When we resort to dry ice, we are admitting that we're licked. I don't want to do that until everything else has failed. I'll call Pete. If he can't fix it, then we will have to dry ice the load. Wait till you hear Pete complain about being called out at this time of the morning. It is morning, isn't it?"

By the time Big Jim had called Pete and placated him sufficiently so he agreed to go to the shop, Jim was awake and decided to go too. Pete and Jim arrived at the car almost simultaneously. The circuit breaker for the evaporator fan was tripping.

"It can't be anything but a bad evaporator fan motor," the night man told Pete. "The magnetic starter for the fan comes in and the equipment operates for a little while, then the fan circuit breaker trips and stops everything. While the equipment operates, the compressor 'snowballs'. That shows the evaporator fan isn't running, doesn't it? We can't see the motor nor get to it as long as the car is loaded. All we can do is dry ice the car. When the load is taken out, a new motor can be applied."

This is the fifteenth article in this series discussing the operation, maintenance and trouble shooting of mechanical refrigerator cars.

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"Well now, just a minute," said Pete, "that motor could be single phasing. It could cause this too. Have you checked all three phases?"

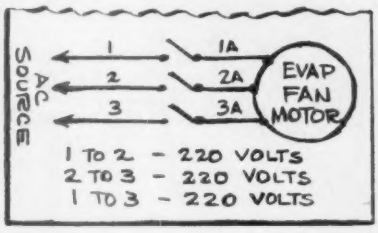
"Sure, Pete; that was one of the first things we checked."

"How did you check it?" asked Pete.

"Why I use the voltmeter, of course."

"That voltmeter could fool you. You should have used the clamp-on ammeter. You get the meter and I'll show you what I mean."

While he was gone, Pete dug around in his pocket and came up with a scrap of paper and a stub of a pencil. He drew a sketch and, when the man came back, Pete explained the circuit.



"If you take a voltmeter reading across wires 1 to 3, George, you will get about 220 volts. Across 1 to 2 you will get 220 volts. It will be the same between wires 2 and 3. That will tell you that you have all three phases up to the starter contacts. With contacts closed, if you read 220 volts between 1A and 2A, between 1A and 3A, between 2A and 3A, that will tell you the circuits are completed through the contactor or starter. It will not tell you whether the circuits are complete into the motor. The only way to be sure that the motor is not single phasing, or has one circuit open, is to read the current flow in each of the three circuits. That can only be done with the clamp-on ammeter. If the current flow is approximately equal in all three 'legs,' then we can assume that all three phases are connected to the motor. If the current reading is high, then the motor will be locked and not turning."

"I'll have to admit, Pete, that I only read to voltage up to the contactor," George said. "That would be on the power side, not the load side. I assumed that, with the contactor picking up, we had a circuit to the motor."

George then went into the machinery compartment and placed the ammeter around one of the wires to the contactor. He then reset the circuit breaker to the evaporator fan. As soon as he did, the controls picked up and the evaporator fan starter closed. He quickly took a reading and switched the ammeter to the other wire. Before he could take a reading of the third circuit, the circuit breaker tripped again. He then had to wait a few seconds for the heater element to cool before he could reset it. After resetting it, he took the reading of the third phase and reported to Pete that he got readings on two of the three legs—nothing on the third. This, of course, indicated that one leg of the three-phase circuit was open.

"You see, Pete, that motor is shot; it will have to be changed out," he concluded triumphantly.

"You might be right, George, but I have a feeling that it's not the motor," Pete said, looking at his sketch. "Can you see those contacts in that starter?"

"No, Pete; they are pretty well covered up."

"Tell you what let's do. Let's take a voltmeter reading on the load side of the starter. Something may be wrong inside."

George picked up the voltmeter, reset the circuit breaker, and read the voltage on all three legs. He then exclaimed, "You were right, Pete; no voltage on the center."

With that, Pete got up into the machinery compartment. Taking his flashlight, he inspected the contactor. Backing away, he noticed something laying in the bottom of the electrical cabinet. It appeared to be a bar type contact.

"Where did this come from? Did you leave it here?"

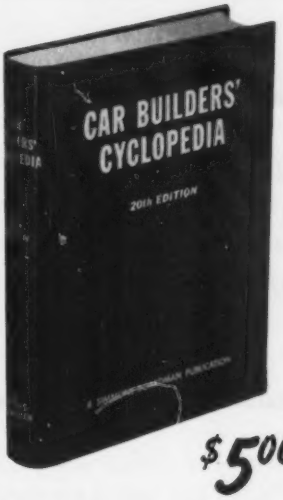
"No, I don't know what it is," George replied. "I never even noticed it before."

It developed that the contact bar had fallen out of the starter and this opened the one phase. After the starter was repaired and the refrigeration equipment was back in service and cooling the car, Big Jim asked Pete, "How could that contact bar drop out?"

"Jim, I frankly don't know. It's one of those things; it shouldn't happen but did. It comes out the way it was put in. The spring holds it and the spring would have to be compressed in order for it to fall out. How that could happen, I don't know. If it was not so early in the morning and I had had my sleep, I might be able to tell you. You sure don't mind getting me out of bed."

"I figured that if I had to get up, Pete, you might as well keep me company. Come on; I'll buy the breakfast."

Car Builders' Cyclopedia



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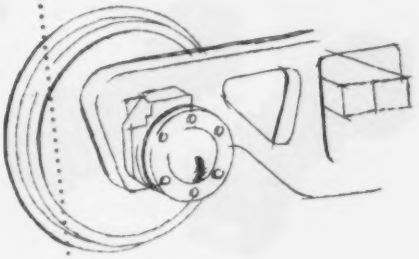

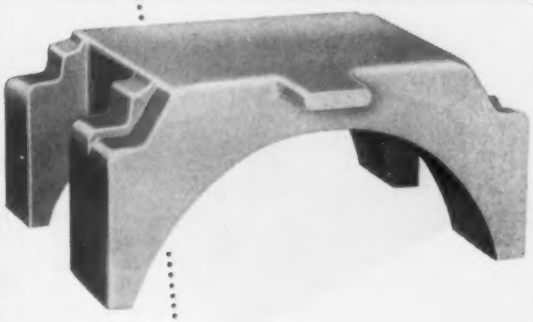

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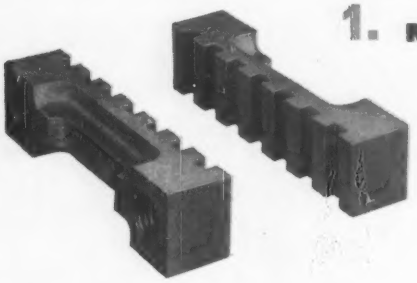

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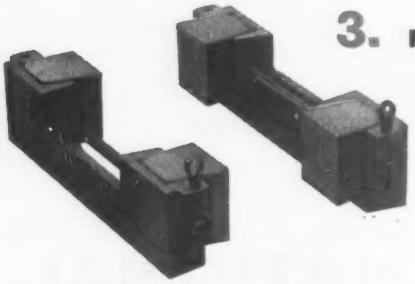

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THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

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Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

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The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

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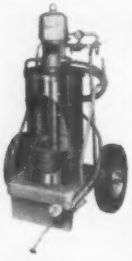

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Mechanical Division Limits Polyurethane Lubricators

Restrictions on the substitution of journal lubricators with polyurethane cores for lubricators with cores "of more proven quality" have been issued by the AAR Mechanical Division. Interchange Rule 66 was revised, effective November 1, with a new paragraph (b)5 which reads as follows:

"Journal lubricating devices having core composed largely of polyurethane must not be used in foreign cars to replace devices having core composed of other core materials having combination of other resilient material, or springs and a limited amount of polyrethane, unless car owner has expressed a preference for such devices. In case of such substitutions, where car owner has not expressed preference for them, no material charge can be made for such lubricating devices applied. This does not apply to first application of journal lubricating devices in place of loose journal-box packing."

This is to control the use of a core material "which is under investigation by the AAR Research Department," the Arbitration Committee explained.

Requirements for core materials in the AAR Specifications for Journal Lubricating Devices is now pending. The committee feels that it would not be equitable to permit uncontrolled substitution of lubricators of this type for more proven types of lubricators.

Because an initial application of polyurethane-core lubricators in place of loose journal-box packing does represent an improvement, there is no restriction on such use.

At the same time, the Arbitration Committee introduced new rules which separate the cost of journal lubricators and their application. The original flat price for the initial applications of these devices made no allowances for the varying prices of the different lubricator designs.

The Mechanical Division has also granted conditional approval of the Premier, Wikit, and Easy-Flo lubricators. November 15 was the effective date.

Personal Mention

Canadian National. — *Toronto, Ont.:* ERIC WYNNE, system chief of motive power and car equipment, named vice-president of *ton, N.B.:* J. R. KEMP, mechanical engineer, appointed mechanical and electrical engineer, Atlantic Region.

Chicago & North Western. — *Cedar Lake, Minn.:* J. E. BREHM appointed master mechanic. *St. Paul, Minn.:* L. N. HASKINS appointed master mechanic with jurisdiction over the Twin Cities division and Sioux City, Iowa of the Nebraska division. *Chicago:* F. E. CUNNINGHAM appointed staff assistant—car.

G. C. Wilms

Jersey Central Lines. — *Elizabeth, N. J.:* G. C. WILMS, JR., assistant superintendent motive power and rolling equipment since March 1949, appointed superintendent

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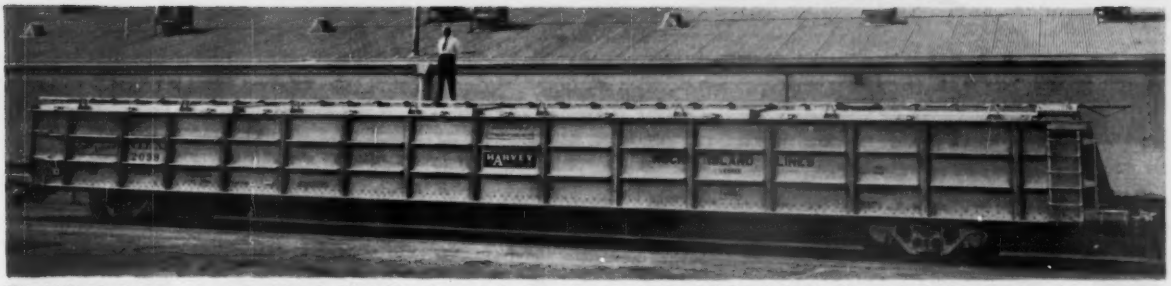

This 85-ft aluminum covered gondola, developed by Harvey Aluminum in cooperation with the Rock Island and North American Car, has been successfully tested in a coast-to-coast run. The car has been designed to provide protective shipment for long-length loads and increase in the payload. It has a light weight of 75,900 lb; a load limit of 134,000 lb, and a capacity of 3,240 cu ft. Six aluminum extrusions, 82 ft long by 25 in. wide, form the body. Three of these channel sections, stacked longitudinally and mechanically joined, form each side. For the roof, panel-type aluminum extrusions were fabricated into four 20-ft sections which are easily removable.

Personal Mention *(Continued)*

motive power and rolling equipment, succeeding HENRY E. WHITENER, retired. Mr. Wilms entered service of Jersey Central in 1947 after 18 years with the B&O where he was regional motive power inspector at Cincinnati, Ohio.

New York Central. — *New York:* C. M. SMITH appointed senior methods and production engineer. R. A. JOHNSON appointed assistant engineer.

New York, Susquehanna & Western.—*Ridgefield Park, N. J.:* F. M. JONES appointed general foreman, maintenance of equipment, Little Ferry Station.

Norfolk & Western.—*Petersburg, Va.:* SILAS J. DEMPSEY appointed foreman, succeeding ROBERT R. SENTER, retired enginehouse foreman. *Bluefield, W.Va.:* HOBART E. NAPIER appointed assistant car foreman, succeeding Mr. Dempsey. *Roanoke, Va.:* GORDON S. HAMILTON, shop inspector, appointed gang foreman, Shaffers Crossing car department, succeeding Mr. Napier.

Richmond, Fredericksburg & Potomac.—*Alexandria, Va.:* ELMER GARNER appointed assistant master mechanic, Potomac Yard.

Southern. — *Macon, Ga.:* JAMES F. HOLBROOK appointed master mechanic. Formerly general car foreman at Ludlow, Ky. *Atlanta, Ga.:* SAMUEL E. BUTLER and CHARLES E. DANIEL appointed general foremen. Formerly general foremen at Spencer, N.C., and Hamburg, S.C., respectively. *Spencer, N.C.:* RALPH H. BINGHAM appointed general foreman. *Columbia, S.C.:* L. C. LAKE appointed general foreman. *Hickory, N.C.:* ORAS R. WAGNER appointed general foreman, Hickory shops. *Cincinnati, Ohio:* F. E. CRANFIELD appointed general car foreman. Formerly general foreman car repairs at Atlanta.

Southern Pacific. — *Houston, Tex.:* Title changes: H. J. BOWYER, acting assistant superintendent, now assistant superintendent; P. L. SCOTT, acting shop superintendent, now superintendent of shops; T. O. SIEGMUND, acting assistant master mechanic, now assistant master mechanic, and W. J. KUGLER, acting general foreman, now general foreman.

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John R. Tench
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AMERICAN BRAKE SHOE CO. — *J. Walter Wallace* appointed general sales manager, National Bearing Division, with headquarters at Meadville, Pa. *George H. Bailey* appointed western sales manager of the division.

■

GOULD-NATIONAL BATTERIES, INC. —*John Robert Tench* appointed vice-president in charge of sales of industrial batteries at Trenton N. J., succeeding *M. W. Heinritz* who continues as vice-president in an advisory capacity.

■

GENERAL ELECTRIC.—Apparatus Service Shop appointments: *Patrick D. McGuire* 318 Urban st., Buffalo, N. Y.; succeeding *O. A. Anderson*, now consultant. *J. E. Schaffer*, Southington shop, 370 Atwater st., Plantsville, Conn.

■

BULLARD CO.—*Wilfred Thompson* appointed vice-president-sales at Bridgeport, Conn. Formerly district sales manager at Detroit, Mich.

■

HALL-TOLEDO, INC.—*Robert Hollis* appointed direct factory sales representative, responsible for sales and customer relations in Ohio, Indiana, Illinois, and contiguous areas.

■

MOTOR COILS MFG. CO.—A third plant of 25,000 sq ft acquired at Emporium, Pa., for manufacture and rebuilding of electric motor coils, exclusively.

■

ELECTRO MOTIVE DIVISION, GENERAL MOTORS.—*Floyd E. von Ohlen*, 4557 Woodland ave., West Springs, appointed regional representative, San Francisco, Calif., region. *Harold P. Gustavson*, 100 S. Spring ave., La Grange, Ill., appointed manager of utility sales, Chicago region, succeeding Mr. Ohlen. Mr. Gustavson formerly manager of utility sales at LaGrange. *George R. Goss*, master mechanic at La Grange, retired.

■

AMERICAN CAR & FOUNDRY DIVISION, ACF INDUSTRIES. — *H. H. Rogge*, president, resigned.

■

BUDD CO. — *Clifford E. P. Smith* appointed manager - container sales, Railway Division.

■

YOUNGSTOWN STEEL CAR CORP.— *John F. McMullen* retained on a consult-

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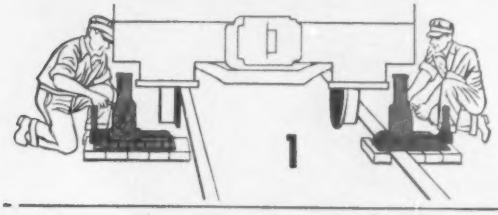
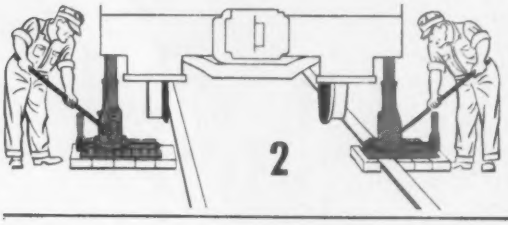
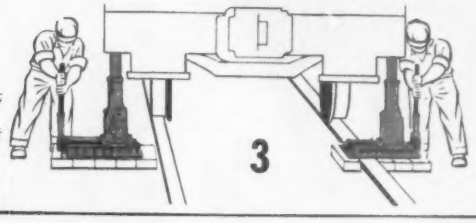


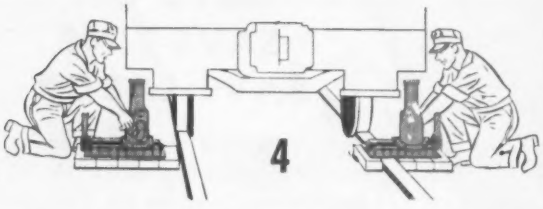
Place a *Duff-Norton traversing base* and jack beside each derailed truck.



Jack up the car or locomotive until wheels clear top of rails.

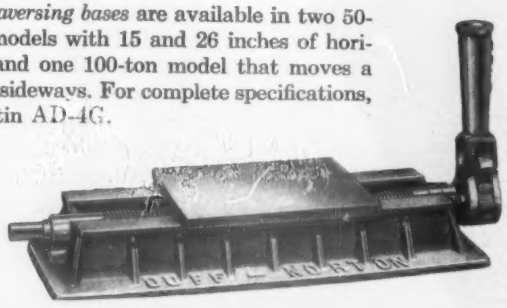


Move jacks horizontally simultaneously on traversing bases until wheels are in alignment with rails.



Lower wheels; you are back on the track, quickly, inexpensively and without danger of distorting car or locomotive frame.

Duff-Norton traversing bases are available in two 50-ton capacity models with 15 and 26 inches of horizontal travel and one 100-ton model that moves a load 20 inches sideways. For complete specifications, write for bulletin AD-4G.



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Ratchet, Screw,
Hydraulic, Worm Gear

DUFF-NORTON

COFFING HOISTS
Ratchet Lever
Chain, Electric

ing basis to assist in development of new railroad products and large car-repair programs. Mr. McMullen recently retired as superintendent car department, Erie.

■

CHICAGO MALLEABLE CASTINGS CO.—*C. A. Benz*, general sales manager, retired.

■

UNITY RAILWAY SUPPLY CO.—*Richard A. Pinney* appointed eastern sales manager, with headquarters in Pittsburgh.

■

PARKER-HANNIFIN CORP. — *Haynes-Orwick Products Co.*, 3711 Highcreat Road, Rockford, Ill, and 8810 Craig Drive, Overland Park, Kan., appointed distributor for Parker industrial hose and hose fittings, including air-brake hose line.

■

M & J DIESEL FILTER CO.—*Richard A. Pinney*, Pittsburgh, Pa., appointed Eastern Zone representative.

■

INTERNATIONAL CAR DIVISION, MORRISON-INTERNATIONAL CORP. — *R. B. Hornberger*, 525 Market st., San Francisco 5, Calif., appointed representative in Alaska, Arizona, California, Idaho, Nevada, New Mexico, Oregon, Utah and Washington.

■

AEROQUIP CORP.—*William Lucht*, manager of distributors' sales, Industrial Div., appointed railroad sales manager.

■

DEARBORN CHEMICAL CO.—Following sales representatives appointed assistant district managers: *J. D. Gill*, eastern district; *C. D. Schroeder*, Illinois-Wisconsin district, and *W. W. Morris*, Pittsburgh district.

■

VAPOR HEATING CORP.—*Nicholas A. D'Arcy* appointed southern California representative.

Helps From Manufacturers

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

FLAME HARDENING. 12-page Form ADC 704A discusses, with illustrations and diagrams, various problems of oxyacetylene flame hardening and how problems can be solved with Airco equipment. (Write: *Air Reduction Sales Co., a division of Air Reduction Co.*, Dept. RLC, 150 East 42nd st., New York 17.)

WINDSHIELD WIPER. 110-page catalog contains application information, engineering data, and parts lists on Air-Push windshield wiper motors and related equipment. Wiper motor maintenance manual included. (Write: *Sprague Devices, Inc.*, Dept. RLC, Michigan City, Ind.)

CLEANING EQUIPMENT. Bulletin 446 contains information on installation, opera-

tion and maintenance of Sellers "Super Booster" hydraulic jet cleaner. (Write: *Sellers Injector Corp.*, Dept. RLC, 1600 Hamilaton st., Philadelphia 30, Pa.)

AIR TOOLS. Catalog No. 64 covers Aro line of portable air tools, self-feed drilling units, air hoists, power motors, special tools and accessories. Line drawings with tabulated dimensions provided for self-feed drilling units and air hoists. (Write: *Aro Equipment Corp.*, Dept. RLC, Bryan, Ohio.)

ASF LABORATORIES. 40-page booklet, "ASF Laboratories . . . Development Source for America's Railroads" deals in detail with the present railroad product research laboratories—four of them "stationary." The fifth laboratory consists of a unique test train that has traveled the equivalent of seven spans around the globe. (Write: *American Steel Foundries*, Dept. RLC, Prudential Plaza, Chicago.)

MODERN TOOLING. Leaflet No. 605 discusses how American Brake Shoe Co. was able to increase production and reduce tool cost by modern tooling in their car-wheel machining operations. (Write: *Kennametal, Inc.*, Dept. RLC, Latrobe, Pa.)

What's New

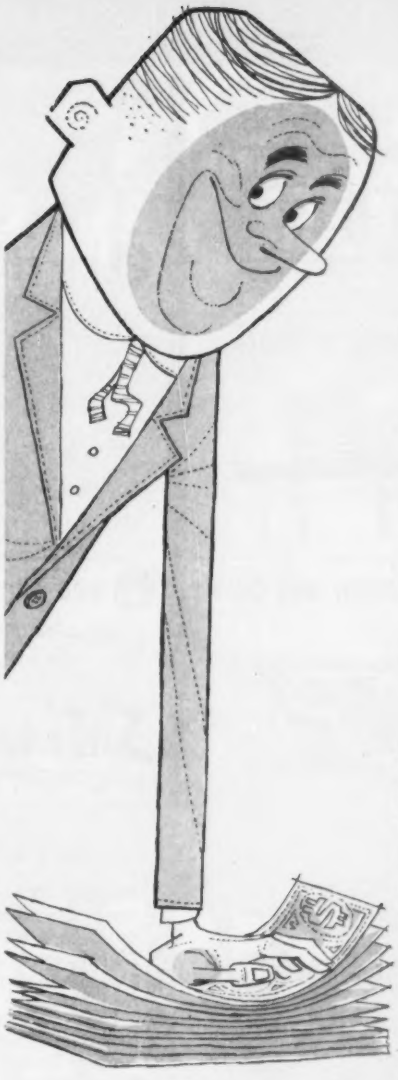
(Continued from page 17)

bility to different material thicknesses, and positive hole-fill even in oversize or out-of-round holes.

The rivets, either in plugged (structural) or hollow (non-structural) types, are applied by one man from one side of the work. Rivet stems fracture cleanly and quickly, and trimming operations are eliminated. The rivets are available with universal or countersunk heads in grip lengths from 1/32 to 1 in., and in diameters of ⅛, 5/32, 3/16, and ¼ in. *Cherry Rivet Div., Townsend Co., Dept. RLC, Box 2157-Z, Santa Ana, Calif.*

De-Icing Nozzle

The under-carriage of rolling stock can be de-iced with the AiResearch de-icing nozzle which provides a means of "de-winterizing" areas which cannot be cleared by conventional snow removal equipment. The nozzle is designed primarily for use with AiResearch GTC 85-90 small gas turbines. Any similar air-flow source may be used, however. *AiResearch Manufacturing Div., Garrett Corp., Dept. RLC, 402 S. 36th st., Phoenix, Ariz.*



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6 WAYS YOU CUT COSTS WITH SCHRAMM COMPRESSORS

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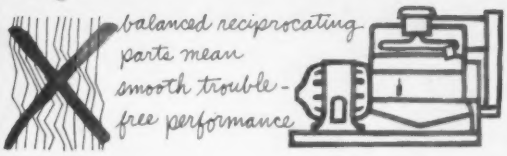
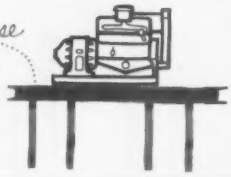
balanced reciprocating parts mean smooth trouble-free performance



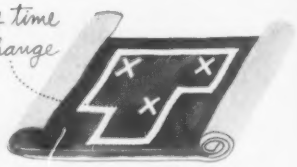
2 you don't have to reinforce floors

any space serves as base
no special foundation
just bolt it down



3 you can move compressor any time

change location any time production plans change

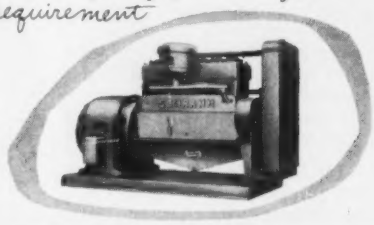


4 Schramm compressors are compact

integral cooling system saves space
put unit overhead
or in odd corners

5 you get a complete package

one unit has everything you need for any air requirement



6 you eliminate central compressors

unit system allows you to buy only the Schramm compressor you need, add as requirements grow

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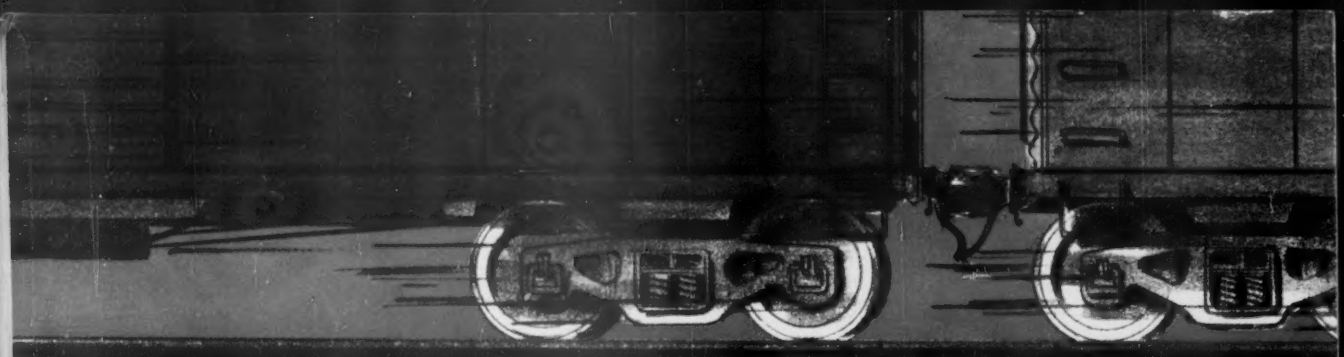

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